CAPE OF GOOD HOPE.

DEPARTMENT OF AGRICULTURE.

MARINE INVESTIGATIONS

IN

SOUTH AFRICA.

VOLUME I.

WITH TWENTY-EIGHT PLATES.

CAPE TOWN:

"CAPE TIMES," LIMITED GOVERNMENT PRINTERS,

B. 159. 1902.

CONTENTS.

	Page.
Introduction. By J. D. F. Gilchrist, M.A., B.Sc., Ph.D.	v–vi
The Flat Fishes of Cape Colony. By G. A. Boulenger, F.R.S.	1–4
Description of a New South African Marine Gasteropod. By G. B. Sowerby, F.L.S. ...	5–7
Descriptions of Two New Gobiiform Fishes from the Cape of Good Hope. By G. A. Boulenger, F.R.S.	8–9
Descriptions of New Fishes from the Cape of Good Hope. By G. A. Boulenger, F.R.S. ...	10–12
On a Specimen of Lophotes Cepedianus from the Cape of Good Hope. By G. A. Boulenger, F.R.S.	13
South African Crustacea. By the Rev. Thomas R. R. Stebbing, M.A., F.R.S., F.L.S., F.Z.S. ...	14–66
The Alcyonaria and Hydrocorallinæ of the Cape of Good Hope. By Sydney J. Hickson, M.A., D.Sc., F.R.S.	67–96
Catalogue of Fishes Recorded from South Africa. By J. D. F. Gilchrist, M.A., B.Sc., Hh.D. ...	97–179
Observations on the Temperature and Salinity of the Sea Around the Cape Peninsula. By J. D. F. Gilchrist, M.A., B.Sc., Ph.D.	181–216
Descriptions of South African Sponges. By R. Kirkpatrick, F.Z.S.	219–232
Indices	233–236
Addenda et Corrigenda	237–238

INTRODUCTION.

This Volume is the first of a series in which it is intended to publish the more scientific results of the Marine Investigations initiated by the Cape Government some years ago.

These investigations were primarily with a view to immediate practical results, and consequently this aspect of the work demanded the first attention. Fortunately this has proved satisfactory, chiefly owing to the discovery of trawling ground on certain parts of the Agulhas Bank, and the successful following up of the work by private enterprise. With regard to other practical matters which primarily demanded attention, a fairly adequate system of fishery statistics has been initiated and carried on for some time; some points in fishery legislation have also been put on a more satisfactory basis, so that attention may now justifiably be directed to more strictly scientific matters of indirect, though, ultimately, of no less practical importance. To these this volume forms a first contribution, and matter for the better part of another volume is now in the hands of the printers.

Collections have, however, been made whenever possible; a great quantity of material has now been procured for examination, and this will be dealt with as time permits. These collections are almost exclusively the results of dredging and trawling in 20 to 100 fathoms, though occasionally an opportunity was afforded of exploring the deeper waters. Very little shore collecting has been possible, but with the now nearly completed Marine Station and additional assistance this will form a more prominent part of the work.

The present method of publication, viz.: printing of reports on part of the material, in some cases on single specimens, is to a certain extent unsatisfactory, but under all the circumstances I think the most practicable. Indices at the end of the volumes will somewhat lessen the disadvantage of detached reports on part of the material, which has been, or will be, procured. Much more work must be done before anything like a complete account of any group can be expected, or the extremely interesting problems connected with the distribution of marine fauna in South African waters can be adequately dealt with.

To the various authors who have examined and reported on the material and are now engaged in the work I have the honour to express the cordial thanks of the Secretary for Agriculture, in whose department the work has been initiated and carried out.

J. D. F. GILCHRIST,

Government Biologist.

CAPE TOWN, *31st December, 1902.*

THE FLAT FISHES OF CAPE COLONY,

BY

G. A. BOULENGER, F. R. S.

Up to the present day only five kinds of flat fishes (Pleuronectidae) were known from the coast of South Africa. I have now received from Dr. Gilchrist an example of a sixth, allied to the British Scald-fish (*Arnoglossus laterna*) which represents a species not only new to the South African Fauna, but also to science. The Flat Fishes of the Cape being still very imperfectly known, I have not contented myself with defining the new fish; but have also drawn up descriptions of the five previously known species, which belong to the genera *Solea*, *Achirus*, *Synaptura* and *Cynoglossus*.

The six species may be distinguished as follows :—

I. Lower jaw projecting beyond the snout; lower eye in advance of the upper; caudal fin distinct from dorsal and anal; sinistral.... *Arnoglossus capensis*, Blgr.

II. Snout projecting beyond the lower jaw, hooked; upper eye in advance of the lower.

A. Caudal fin distinct from dorsal and anal; dextral.

Pectoral fins present, short. .*Solea bleekeri*, Blgr.

Pectoral fins absent. .*Achirus capensis*, Kaup.

B. Caudal fin confluent with dorsal and anal.

1. Dextral; pectoral fins present.

Right pectoral longer than head. *Synaptura pectoralis*, Kaup.

Right pectoral shorter than head. *Synaptura microlepis*, Blkr.

2. Sinistral; pectoral fins absent. *Cynoglossus capensis*, Kaup.

1. ARNOGLOSSUS CAPENSIS, sp.n.

Eyes on the left side, lower in advance of upper by half its length. Mouth symmetrical, with a single series of small teeth; lower jaw projecting a little beyond the upper; maxillary extending to below anterior border of lower eye. Snout $\frac{2}{3}$ diameter of eyes, which is $3\frac{1}{2}$ times in length of head and 4 times interocular width; length of mouth $3\frac{1}{2}$ times in

length of head. Depth of body $2\frac{1}{4}$ in total length, length of head $4\frac{1}{2}$ times. Gill-openings moderately wide. Dorsal fin originating on the snout, with 81 sub-equal rays measuring about $\frac{1}{2}$ length of head, Anal with 72 rays. Left pectoral fin 2-3 length of head; right $\frac{1}{2}$. Caudal distinct from dorsal and anal, rounded, nearly as long as head. Scales moderate, smooth, very thin and deciduous*; a single lateral line with semi-circular curve above the pectoral, piercing about 60 scales. Colourless.

Total length, 160 millimetres.

Described from a single specimen from False Bay, one of three found by Dr. Gilchrist in trawling.

2. SOLEA BLEEKERI.

Pegusa impar (non Benn.), Bleek. Versl. Akad. Vet. Amsterd. XV. 1863, p. 458.

Eyes on the right side, upper in advance of lower. Snout hooked; mouth unsymmetrical, extending to below lower eye; teeth minute, on the blind side only; snout and lips with short fringes. Gill-openings moderately wide. Depth of body $2\frac{2}{3}$ times in total length, length of head $4\frac{2}{3}$ times. Diameter of eyes about seven times in length of head, nearly equal to interocular width. Dorsal and anal fins extending to but distinct from the caudal, the former with 74 rays, the latter with 59, longest about $\frac{1}{3}$ length of head. Pectorals equally developed on both sides, not $\frac{1}{3}$ length of head. Caudal obtusely rounded. Scales small, ctenoid on both sides; lateral line single, extending straight from the head to the caudal, and piercing about 100 scales. Coloured side olive-brown, marbled with darker, distal half of the right pectoral with a large black spot.

Total length 174 millimetres.

The type specimen, from the Cape of Good Hope, is preserved in the Leyden Museum.

3. ACHIRUS CAPENSIS.

Heteromycteris capensis, Kaup, Arch. f. Nat. 1858, p. 103.

Eyes on the right side, upper in advance of lower. Snout hooked; mouth unsymmetrical, extending to below lower eye; teeth minute, on the blind side only; snout and lips with short fringes. Gill-openings moderately wide. Depth of body $2\frac{2}{3}$ times in total length. Dorsal and anal fins extending to but distinct from the caudal, the former with 98

* Whence the name "Scaldfish," which is applied to its British congener.

to 102 rays, the latter with 67 to 75. Pectorals absent. Caudal rounded. Scales small, ctenoid on both sides; lateral line single, extending straight from the head to the caudal, and piercing 83 to 85 scales. Pale greyish, with dark specks and three longitudinal series of small black spots. Several young specimens, obtained in False Bay by Dr. Gilchrist.

4. SYNAPTURA MICROLEPIS.

Synaptura microlepis, Bleek. Versl. Akad. Vet. Amsterd. XV. 1863, p. 456.

Eyes on the right side, upper in advance of lower. Snout hooked; mouth unsymmetrical, extending to below centre of lower eye; teeth minute, on the blind side only; snout with minute fringes; lips not fringed. Gill-openings moderately wide. Depth of body $3\frac{1}{2}$ to $3\frac{2}{3}$ times in total length, length of head 5 to 6 times. Diameter of eyes $7\frac{1}{2}$ times in length of head, $\frac{2}{5}$ interocular width; length of mouth 4 times in length of head. Dorsal and anal fins confluent with the rounded caudal; dorsal with 90 to 99, anal with 75 to 78 rays, longest about $\frac{1}{3}$ length of head. Right pectoral fin $\frac{1}{2}$ to $\frac{2}{3}$ length of head, left $\frac{1}{4}$ to $\frac{2}{5}$. Scales very small, ctenoid on both sides; lateral line single, straight, extending over 170 to 180 scales. Coloured side pale brown, speckled with dark brown; fins closely spotted and speckled with blackish.

Total length 295 millemetres.

The type specimen, from Cape of Good Hope, is in the Leyden Museum. I have been favoured by Dr. Gilchrist with a specimen from the West Coast (near Dassen Island).

5. SYNAPTURA PECTORALIS.

Synaptura pectoralis, Kaup, Arch. f. Nat. 1858, p. 96.

Eyes on the right side, upper slightly in advance of the lower. Snout hooked; mouth unsymmetrical, extending to below centre of lower eye; teeth minute, on the blind side only; snout with minute fringes; lips not fringed. Gill-openings moderately wide. Depth of body $3\frac{1}{4}$ to $3\frac{1}{2}$ times in total length. Length of head $5\frac{3}{4}$ to 7 times. Diameter of eyes 6 to 9 times in length of head, nearly equal to interocular width; length of mouth 3 to $3\frac{2}{3}$ times in length of head. Dorsal and anal fins confluent with the obtusely pointed caudal; dorsal with 95 to 110, anal with 80 to 95 rays, longest not more than half length of head. Right pectoral pointed at the end, $1\frac{1}{3}$ to twice as long as the head; left pectoral very

short. Scales very small, ctenoid on both sides; lateral line single, straight, extending over 150 to 170 scales. Coloured side brown, uniform or speckled with darker; fins blackish towards the edge, dorsal and anal speckled or spotted with dark brown; right pectoral black.

Total length 470 millimetres.

I have examined eight specimens from the Cape (presented by the late T. H. Powell, Esq.) and from Algoa Bay (presented by Dr. H. A. Spencer and by Mr. J. M. Leslie).

6. CYNOGLOSSUS CAPENSIS.

Solea vulgaris, Pappe, Syn. Ed. Fish. Cape, p. 32 (1853).
Trulla capensis, Kaup, Arch. f. Nat. 1858, p. 109.
Plagusia capensis, Casteln. Poiss. Afr. Austr. p. 71 (1861).
Cynoglossus capensis, Günth, Cat. Fish, IV. p. 503 (1862).

Eyes on the left side, close together, upper slightly in advance of the lower. Snout hooked; mouth unsymmetrical, extending to below centre of lower eye; teeth minute, on the blind side only; lips not fringed. Gill-openings narrow. Depth of body $3\frac{1}{2}$ times in total length, length of head 5 to $5\frac{1}{4}$ times. Diameter of eyes 6 or 7 times in length of head, length of mouth 4 times. Dorsal and anal fins confluent with the pointed caudal, 116-127 rays above, 100-107 below (caudals included), longest about $\frac{1}{3}$ length of head. Left pectoral fin rudimentary, right absent. Scales moderate, ctenoid on the coloured side, cycloid on the blind side, three lateral lines extending on the head, connected by a perpendicular line between the eyes and the gill-opening; middle lateral line piercing 103-118 scales on the body and tail. Pale brownish, caudal fin blackish; adult with bright red round spots on the dorsal and anal fins.

Total length 300 millimetres; reaches to 400 according to Castelnau.

Dr. Gilchrist obtained this sole in abundance in False Bay, and one specimen near Dassen Island. The British Museum has received a specimen from Algoa Bay, through Mr. J. M. Leslie.

DESCRIPTION

OF A

NEW SOUTH AFRICAN MARINE GASTEROPOD.

BY

G. B. SOWERBY, F.L.S.

The remarkable Mollusc placed in my hands for examination by Dr. J. D. F. Gilchrist, of the Department of Agriculture, presents such a series of distinctive features that it cannot well be placed in either of the recognised genera. It is in fact difficult to determine to what Family it belongs, having characters in common with the *Volutidae*, *Buccinidae*, and *Fusidae*. The most striking feature in the shell is its apex, the nucleus being large and of a curious bulb-like form; otherwise the shell would be taken for a species of *Neptunea* (Bolton) = *Chrysodomus* (Swainson). The operculum is quite similar to that of a Fusus, though small in proportion to the aperture. On the other hand the soft parts much more resemble the *Volutidae;* the radula is just like that of *Voluta*, and quite unlike those of the *Fusidae* and *Buccinidae*

On the whole I have come to the conclusion that this new form must take its place in or near the family *Volutidae.*

The shell bears some resemblance to *Neptunea norvegica (Fusus norvegicus*, Chemnitz) to which Mörch gave the subgeneric name *Volutopsis.* This has suggested to me the name *Neptuneopsis* for the new genus, which may be placed in the family *Volutidae.*

For the description of the anatomy of the soft parts I am indebted to Mr. Martin F. Woodward, of the Royal College of Science, and Hon. Secretary of the Malacological Society of London.

NEPTUNEOPSIS, nov. gen.

Shell elongated posteriorly, with ovate body-whorl; nucleus large, bulbiform; aperture rather large, lip slightly reflexed; columella simple, without plaits; operculum much smaller than the aperture, oblong, horny, with nucleus at the anterior exterity.

Head with large conical tentacles, widely diverging, bearing the eyes on an expansion of their postero external margin; snout rather long, apparently not introvertible. Between the muscular foot and the snout a soft prominence is present probably marking the opening of a pedal gland. Foot large, oblong, double edged in front. Anterior siphon well developed. In the character of the gill, the osphradium, and mucous gland,. as well as in the position of the anal, genital, and renal orifices, this form is indistinguishable from *Voluta*.

The œsophagus, stomach, and intestine form a simple U-shaped bend, and resemble those of *Voluta* and other prosobranchs. An enormous appendix to the œsophagus entirely fills up the anterior body cavity. No peculiarities are presented by the heart or genital organs.

The nervous system at first sight seems to resemble that of *Voluta* and *Cancellaria*, the sub-intestinal ganglia curving round under the œsophagus, and connecting the left with the right pleural. It however differs from these two genera in the relation of the supra-intestinal ganglia, and in this respect more nearly approaches the *Buccinidae*.

Radula.—A single series of tricuspid teeth, no laterals.

NEPTUNEOPSIS GILCHRISTI, sp.nov.

Shell elongately ovate, of light substance, rather thin, semi-transparent; of a light pinkish buff-colour throughout, covered with a very thin, fine texture olive-brown epidermis; spire rather long, nucleus large, rounded at the base, and rising to a blunt point at the summit, slightly tortuous, having much the form of a tulip bulb; whorls (exclusive of the nucleus) 6, moderately and regularly convex, smooth, longitudinally very finely striated, the striæ being rendered somewhat irregular by coarser growth lines; spirally finely wrinkle-striated ; suture impressed ; last whorl ovate, about equal in length to the spire, attenuated and slightly produced at the base, but not rostrate; aperture slightly expanded; columella rather straight, without folds or plaits, covered with a thin effused enamel of the same colour as the rest of the shell; outer lips slightly reflexed at the margin.

Operculum oblong, horny, dark brown with nucleus at the extremity; exterior marked with faint concentric laminæ ; and with a longitudinal depression in the middle ; interior roughly corrugated, with a shining cartilaginous border. Radula very small, with a single series of oblong,

laterally arcuate teeth, with three proportionally large, sharply angular cusps, which are nearly equal; no side teeth.

Length of the shell	165	millimetres.
Maximum diameter	57	"
Length of aperture	80	"
Width " "	26	"

Habitat off the Cape of Good Hope, 33 fathoms.

Ar[illegible]r Rich pinx.   West Newman chromo

[illegible] GILCHRISTI (Sowerby.)

[illegible] & Operculum (Exteri[illegible]r)

[illegible] Operculum. ([illegible]xterior) D Radula (Portion.)

DESCRIPTIONS OF TWO NEW GOBIIFORM FISHES FROM THE CAPE OF GOOD HOPE.

BY

G. A. BOULENGER, F.R.S.

GOBIUS GILCHRISTI.

No canine teeth. Depth of body four times in total length, length of head $3\frac{1}{3}$ or $3\frac{1}{4}$. Head as broad as deep, $1\frac{1}{4}$ as long as broad; lower jaw projecting beyond the upper; maxillary extending to below anterior border of eye; diameter of eye $4\frac{1}{2}$ to 5 times in length of head; inter-orbital space narrow, about half diameter of eye; head naked; organs of the lateral line forming six vertical and two horizontal series on the cheek. Dorsal VI, I 12; first dorsal in contact with the second, nearly equally distant from the end of the snout and the base of the caudal; none of the rays produced; longest ray of second dorsal half length of head. Anal I 10, opposite to soft dorsal. Pectoral without filiform rays. Ventral reaching vent or not quite so far. Caudal rounded. Caudal peduncle $1\frac{1}{2}$ as long as deep. Scales 55-56 in a longitudinal series, 17-19 in a transverse series between dorsal and anal. Olive above, spotted and marbled with blackish, dirty yellowish beneath; fins dark grey; spinous dorsal streaked with black, soft dorsal and anal with small black spots, both dorsals edged with whitish.

Total length 110 millimetres.

Specimens were obtained by shrimp net in little Brak River, Mossel Bay, in June, 1898. The river is salt for several miles inland, as I am informed by Dr. Gilchrist, to whom we are indebted for the discovery of this and the following species.

CALLIONYMUS COSTATUS.

Depth of body eight times in total length, length of head not quite four times. Head $1\frac{1}{2}$ as long as broad ; eyes close together, as long as the snout, $\frac{1}{3}$ length of head ; gill-opening reduced to a small foramen on the upper surface of the head ; preopercular spine curved upward, unicuspid, not $\frac{1}{2}$ diameter of eye. Dorsal III, 10 ; first dorsal very small, longest ray measuring $\frac{1}{3}$ length of head ; first ray of soft dorsal longest, $\frac{3}{4}$ length of head. Anal 10. Ventral reaching beyond vent. Lateral line single, much developed, sending off perpendicular branches above and below, the upper branches, 35 in number extending to the middle line of the back, giving the body a ribbed appearance. Yellowish grey, back finely speckled with brown ; small blackish spots above and below the lateral line ; spinous dorsal blackish.

Total length 55 millimetres.

This new species is described from two of four specimens (probably young) procured in trawl 11 miles off Cape St. Blaize in June, 1898, 40 fathoms.

DESCRIPTIONS OF NEW FISHES FROM THE CAPE OF GOOD HOPE.

BY

G. A. BOULENGER, F.R.S.

CAESIO AXILLARIS.

Depth of body $2\frac{2}{3}$ in total length, length of head $3\frac{2}{3}$ times. Snout a little longer than diameter of eye, which is four times in length of head and $1\frac{1}{2}$ in interorbital width; least width of preorbital $\frac{1}{2}$ diameter of eye; maxillary extending to below anterior border of eye; head everywhere densely scaled, except on the snout, forehead, and chin, which are naked. Gill-rakers long and slender, 22 on lower part of anterior arch. Dorsal XI 12; spinous portion naked, soft portion scaly at the base; middle spines longest, $\frac{2}{5}$ length of head, longer than the soft rays. Pectoral falciform, slightly longer than head. Ventral much shorter, not reaching vent. Anal III 11; third spine longest, a little longer than soft rays, which decrease in length to the last. Caudal crescentic, scaly at the base. Caudal peduncle nearly twice as long as deep. Scales finely denticulate, $80\frac{9-10}{20}$, much larger below than above the lateral line, which extends over 64 scales. Silvery, tinged with yellow above; a round deep black spot in the axil.

Total length 275 millimetres.

Obtained in Buffalo Bay (in False Bay), 8th October, 1898, 20 fathoms. Differs from *Caesio lunaris*, C. & V., which occurs at the Cape, and which has also a black axillary spot, in the smooth spinous dorsal fin, the third anal spine longer than the second, and in the absence of black tips to the lobes of the caudal fin. Besides, the scales on the head are much smaller in *C. axillaris* than in *C. lunaris*.

SYNAPTURA MARGINATA.

Upper eye entirely in advance of lower. Mouth extending to below posterior border of lower eye; snout, lips, and borders of gill-cleft with strong fringes; a fringed dermal flap covering the nostril on the blind side. Depth of body $2\frac{1}{3}$ in total length, length of head 5 times. Diameter of eyes 9 times in length of head, equal to inter-ocular width; length of mouth three times in length of head. Dorsal with 73 rays, anal with 54, longest about $\frac{1}{2}$ length of head. Caudal obtusely acuminate. Right and left pectoral fins equal in length, measuring nearly $\frac{1}{3}$ length of head. Scales larger than in *S. microlepis* and *S. pectoralis*, strongly ctenoid on the coloured (right) side, nearly smooth on the left side; lateral line straight, extending over 105 scales. Coloured side blackish brown; right pectoral and vertical fins black, edged with white.

Total length 270 millimetres.

Only a single specimen was obtained by the trawl from lat. 33-52-30 S., long. 25-47$\frac{1}{2}$ E. (Algoa Bay), 22 fms.

This species is easily distinguished from its two South African congeners, and necessitates the following addition to the synopsis given in the first part of these reports (1898 p. 1).

11. Snout projecting beyond the lower jaw, hooked; upper eye in advance of the lower.

B. Caudal fin confluent with dorsal and anal.

1. Dextral; pectoral fins present.

Right pectoral fin longer than head. *Synaptura pectoralis*, Kaup.

Right pectoral fin $\frac{1}{2}$ to $\frac{2}{3}$ length of head. *Synaptura microlepis*, Blkr.

Both pectoral fins $\frac{1}{3}$ length of head. *Synaptura marginata*, Blgr.

HIPPOCAMPUS CAPENSIS.

10 segments on the body, 34 on the tail, tubercles absent on the head and body, short and blunt on the tail. Snout very short, hardly twice diameter of eye, shorter than postorbital part of head. Dorsal with 17 rays, inserted on the last two segments of the body and the first of the tail. Dark brown; snout whitish; dorsal fin with a black sub-marginal band.

Total length 90 millimetres.

Found in Knysna Harbour, at low tide.

Closely allied to *H. antiquorum*, Leach, from which it differs in the absence of tubercles on the head and body.

Castelnau (Mém. Poiss. Afr. Austr. 1861, p. 74) had already recorded the presence of a sea-horse at the Cape, but had been unable to identify the species.

ENGRAULIS HOLODON.

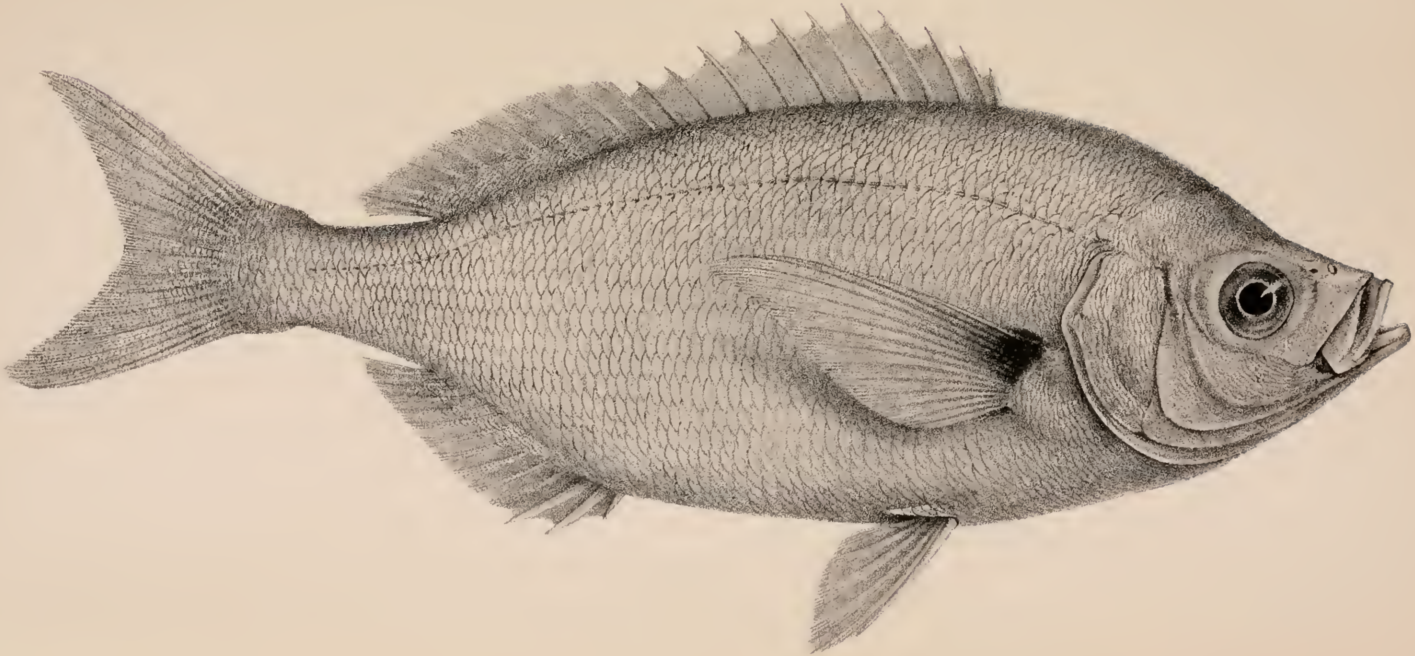
Depth of body 5 to $5\frac{1}{2}$ times in total length, length of head 4 times. Snout pointed, strongly projecting, shorter than the eye, the diameter of which is three times in the length of the head. Teeth present in both jaws, minute; maxillary tapering behind, extending to the gill-opening. Gill-rakers long, 12 on lower part of anterior arch. Dorsal with 14 rays, originating a little nearer root of caudal than end of snout. Anal with 19 or 20 rays, originating below middle of dorsal. Pectoral $\frac{2}{3}$ length of head. Spiny scales of abdomen 9 in number, extending between pectorals and ventrals. Caudal deeply forked. Caudal peduncle twice as long as deep. 40 to 42 scales in a longitudinal series, 9 in a transverse series. A silvery lateral stripe.

Total length 50 millimetres.

Young specimens were obtained by seine net in the tidal Zwartkops River, Algoa Bay.

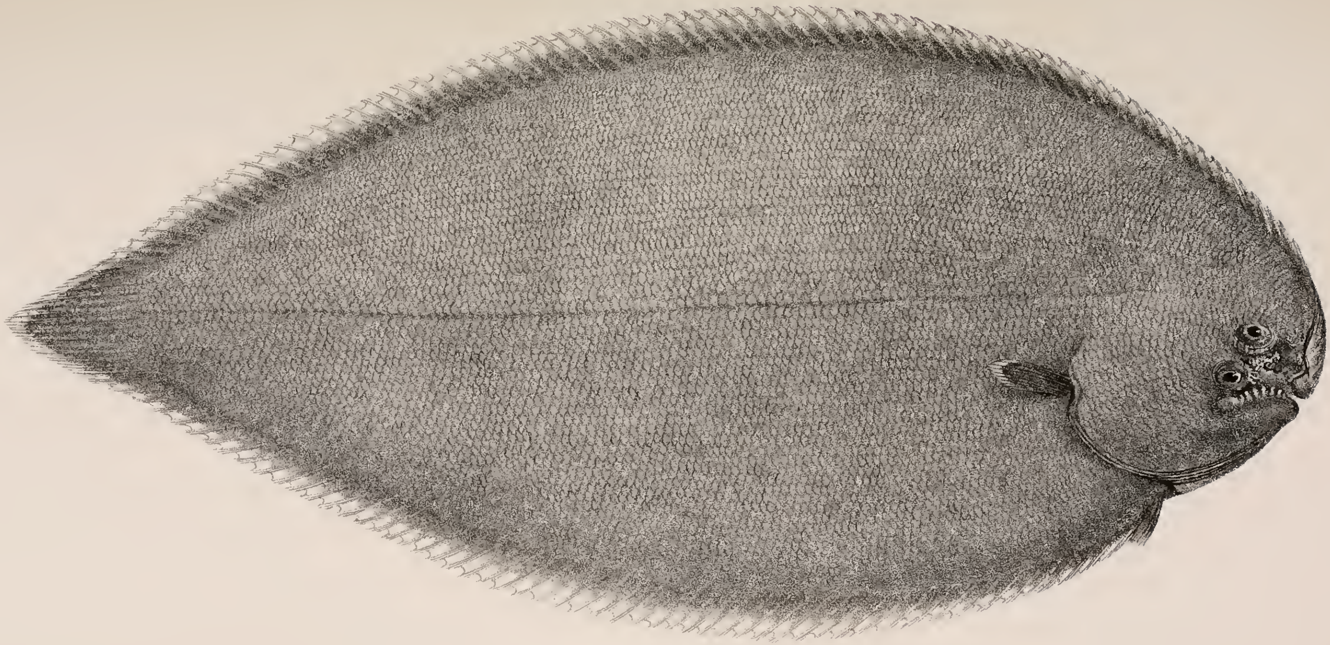
The "Ansjovis" of the Cape fishermen has hitherto been referred to *E. enchrasicholus*, without having been compared with European specimens. These, as well as the Australian and Neo-zelandian *E. antipodum*, differ in the narrower and shorter maxillary, the toothless mandible, and the dorsal fin entirely in advance of the anal.

[Published, 2nd February, 1900.]



J. Green del. et lith. Mintern Bros. imp.

CÆSIO AXILLARIS. (5/8)



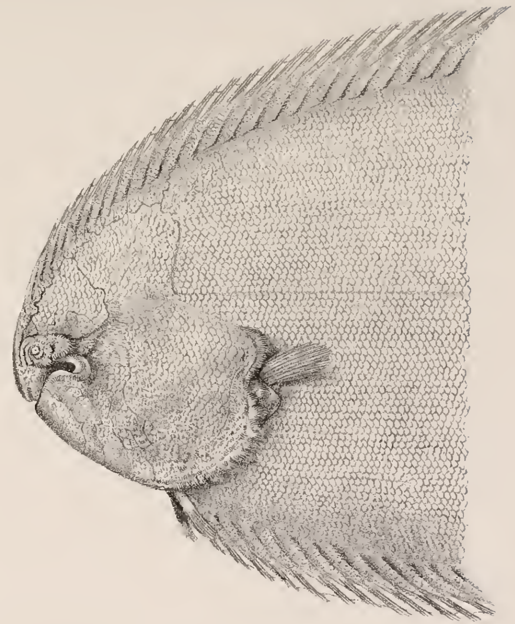
2/3

J. Green del. et lith. Mintern Bros. imp.

SYNAPTURA MARGINATA.

3.

2.



1.

J. Green del et lith

Mintern Bros. imp.

1. SYNAPTURA MARGINATA. 2. HIPPOCAMPUS CAPENSIS. 3. ENGRAULIS HOLODON.

ON A SPECIMEN OF

LOPHOTES CEPEDIANUS

FROM THE

CAPE OF GOOD HOPE.

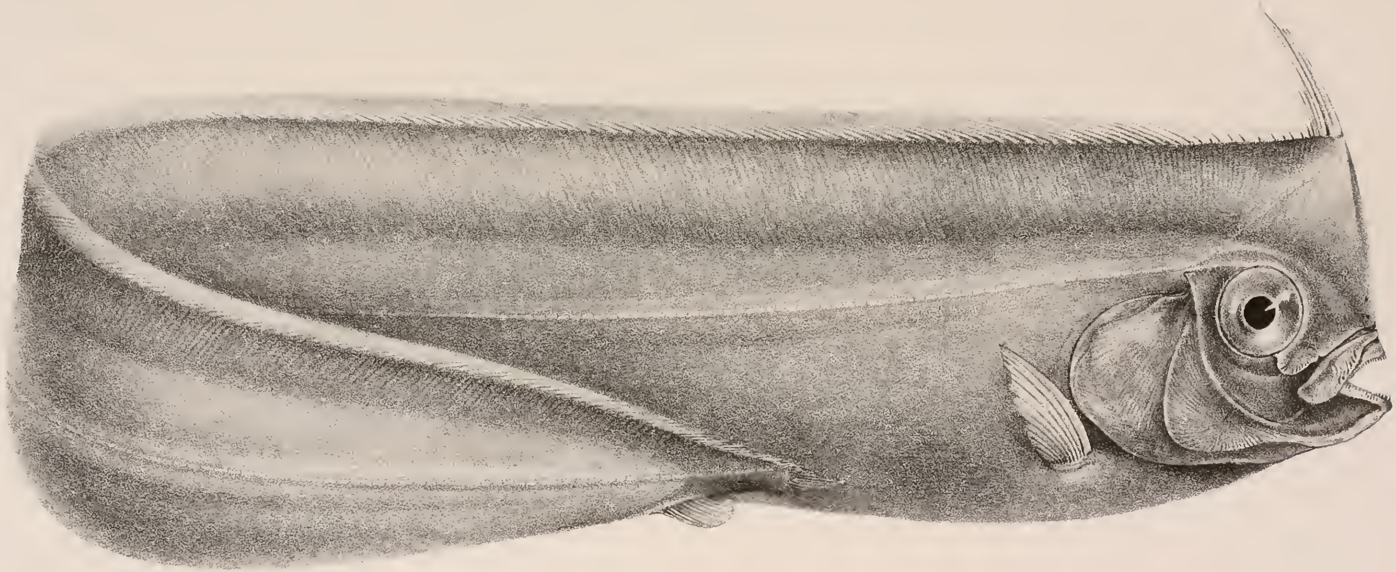
BY

G. A. BOULENGER, F.R.S.

I have received from Dr. Gilchrist a specimen of *Lophotes cepedianus*, Giorna, cast up on the shore at Mossel Bay in August, 1899. So few examples of this remarkable fish have yet fallen into the hands of naturalists that the capture of one at the Cape is well worthy of record, the more so as it widely extends the ascertained range of the species to which it belongs. *Lophotes cepedianus* was only known from the Mediterranean, and the Sea off Madeira if we regard *L. cristatus*, Johnson, as a synonym. There is, however, in the British Museum, a specimen bearing no indication of locality, presented by Sir Andrew Smith in 1852, which may very well have been procured in South Africa. A second species of *Lophotes* has been described by Günther a few years ago (Proc. Zool. Soc. 1890, p. 244, pls XIX. and XX.) from a specimen washed up on the shore of Kalk Bay. This fish, for which the name *L. fiskii* was proposed by Günther, differs very widely from the typical form of the genus; its extremity elongate, ribbon-like form and the probable absence of an anal fin, to say nothing of the frontal crest and the absence of ventral fins, indicate, in my opinion, a distinct genus.

The specimen from Mossel Bay, which is figured on the accompanying plate, measures 1 metre 18. The depth of the body is contained $6\frac{1}{5}$ times in the total length, the length of the head 8 times; the depth of the head equals its length; the diameter of the eye is contained $3\frac{1}{2}$ times in the length of the head; the maxillary extends a little beyond the vertical of the anterior border of the eye; the dorsal fin contains 245 rays, the anal 19.

[Published, 19th April, 1900.]



J Green del et lith

LOPHOTES CEPEDIANUS. (2/7)

SOUTH AFRICAN CRUSTACEA.

BY THE

Rev. THOMAS R. R. STEBBING,

M.A., F.R.S., F.L.S., F.Z.S.

When about two years ago I received from Dr. Gilchrist the first of the Crustacea which he has been sending me from South African waters, the hope entered my mind that in course of time I might be able to produce a systematic review of the whole carcinological fauna of the region over which the Government of Cape Colony is extending its scientific investigations. It has now, however, become clear to me that such a plan would not only involve very serious delay before any results could be published, but would also have little chance of securing that completeness and finality for the sake of which the delay might be justified. On the very eve of publication an inconsiderate trawl might bring up from the vasty deep a miscellaneous assortment of the unknown and the unexpected, and the symmetry of the main treatise would have to be destroyed by an appendix of odds and ends more interesting and more important perhaps than anything contained in the methodical catalogue. Forsaking, therefore, more ambitious projects, I offer the present report as an instalment in which the student may possibly find some points worthy of his notice. Should other instalments follow, the inconvenience arising from a somewhat desultory mode of publication may in the end be remedied wholly or to a great extent by a satisfactory index. In the higher groups of the Malacostraca the recent systematic labours of Dr. Ortmann and Major Alcock may be said to hold the field. Accepting their decisions as to large sections, I here confine my own comments chiefly to genera and species.

BRACHYURA.

Cyclometopa.

Fam. : Xanthidae.

Gen. : Pilumnus, Leach, 1815.

Dr. Ortmann, in his "Decapoden und Schizopoden der Plankton-Expedition," p. 55, 1893, and in his Decapoden-Krebse des Strassburger Museums, pt. 7, Zool. Jahrb., v. 7, p. 433, 1894, has transferred this genus to a sub-fam. *Pilumninae* of a new family *Menippidae*, which he includes in the Xanthini, his third sub-group of the Cyclometopa. Major Alcock, in his "Materials for a Carcinological Fauna of India," No. 3, p. 69, 1898, divides the Cyclometopa into four families, *Cancridae*, *Xanthidae*, *Portunidae*, *Telphusidae*, and makes the *Pilumninae* the sixth sub-family of the *Xanthidae*. In No. 4 of the same work, in 1899, he adds the *Corystidae* as a fifth family of the Cyclometopa. Miss M. J. Rathbun, in 1900, substitutes '*Pilumnidae* Leach' for '*Xanthidae* Alcock' (American Naturalist, vol. 34, p. 132).

Pilumnus verrucosipes, Stimpson.

1858. *Pilumnus verrucosipes*, Stimpson, Prodromus descr. anim. evert. Exp. ad Pacificum Septentrionalem, Proc. Ac. Nat. Sci. Philad., Dec. 1857, p. 34.
1881. *Pilumnus verrucosipes*, Miers, Ann. Nat. Hist., Ser. 5, v. 8, p. 216, t. 13, f. 5.
1886. *Pilumnus verrucosipes*, Miers, Challenger Brachyura, Reports, v. 17, p. 146.

This little species has the carapace, except the frontal margin, covered with a close felting of short hairs, from among which arise singly or in groups longer cylindrical or clavate setae. All the limbs are furnished with similar setae and also with warts, of which Stimpson notices that the chelipeds have nine on the fifth joint and five on the sixth. This is true of the specimen from Mossel Bay, and concerning four specimens from Goree Island, Senegambia, Miers remarks that they agree in all respects with Stimpson's diagnosis.

Stimpson's specimen was taken at the Cape in Simon's Bay, on a sandy bottom, in eleven fathoms. The present specimen was taken at Mossel Bay, 10 fathoms, on a large ascidian locally known as "red bait." Dr. Gilchrist remarks that the "muddy-looking carapace and limbs give a (protective ?) resemblance to the large ascidian on which it was found."

Fam.: Corystidae.

Gen.: Nautilocorystes, Milne-Edwards.

1829. *Corystes* (part) Latreille, Le Règne Animal, Cuvier, nouv. éd., v. 4, p. 53.
1833. *Dicera* (not Germar, 1817) de Haan, Siebold's Fauna Japonica, Crustacea, pp. 4, 14 (see also pp. 112, xvi, xxviii, and mouth-organs t. A).
1837. *Nautilocorystes*, Milne-Edwards, Histoire Naturelle des Crustacés, v. 2, p. 149.
1843. *Dicera*, Krauss, Die südafrikanischen Crustaceen, p. 27.
1853. *Dicera*, Dana, U.S. Exploring Expedition, v. 13, p. 298.
1893. *Nautilocorystes*, Stebbing, History of Crustacea, p. 74-75.
1899. *Nautilocorystes*, Alcock, Journ. Asiatic Society of Bengal, v. 68, pt. 2, p. 104.

Like *Corystes* in general form and in the arrangement of the second antennae for forming an antennal tube, but distinguished from it by two salient features, the third maxillipeds having the fourth joint decidedly shorter instead of longer than the third, with the fifth inserted not below but on the apex, and the last trunk-leg having the terminal joint flatly expanded with convex inner margin instead of being narrow with inner margin straight. The five-jointed pleon of the male is rather longer than in *Corystes*, the composite segment not deeply notched. The second and third trunk-legs have the terminal joint compressed as in the fifth pair, but less expanded, only the fourth pair being narrow, with triangular section ; in all the apex is acute.

To the above characters de Haan adds that the buccal area is oblong, narrower in front ; outer plates of first maxillipeds above the middle incurved, narrow, on the inner margin truncate, ciliated, at the apex acute, peduncles of the palps surpassing the length of the outer plates, the flagella short ; peduncles of palps of the second maxillipeds shorter than the maxillae (but in *Corystes* longer).

The importance of the antennal tube in the Corystidae is clearly explained by Mr. Walter Garstang in the Journal of the Marine Biological Association, N.S., v. 4, No. 3, pp. 223-232. The animal deeply burrowing in the sand, with only the tips of its long antennae above it, is no longer in a position to breathe in the ordinary way by allowing the water to enter its branchial chamber beneath the branchiostegite, and after bathing the gills to pass out by the apertures at the side of the mouth. It, therefore, reverses the current, allowing the water to pass down the tube formed by the juxtaposed hairy antennae and after serving the two branchial chambers to make its exit by the usual doors of entrance.

Nautilocorystes octodentatus (de Haan).

1833. *Corystes* (*Dicera*) 8-*dentata*, de Haan, Fauna Japonica, Crust., Decas 1, p. 15.
1837. *Nautilocorystes ocellatus*, Milne-Edwards, Hist. Nat. Crust., v. 2, p. 149.
1843. *Dicera* 8-*dentata*, Krauss, Südafrik. Crust., p. 27.
1857. *Nautilocorystes ocellatus*, Stimpson, Proc. Ac. Nat. Sci. Philad., Prodromus, p. 23.

The specific name chosen by de Haan evidently refers to the prominent teeth of the antero-lateral margins, the teeth of both sides being added together to form the number eight, a method which is followed also in naming the species *Oeidia* 20-*spinosa*. In the present instance there is a slight complication, because in the generic account de Haan speaks of the thorax as being "5-spinosus" on the sides. He is then evidently including the small tooth at the outer corner of the orbit, which in the specific name he leaves out of reckoning as an inconspicuous feature. The name given by Milne-Edwards no doubt refers to markings on the carapace, which in the specimen here described are very suggestive of the name *ocellatus*. In spirit they appear as thin reddish brown lines forming irregular ovals or circles, of which the four principal ones are disposed in a broad quadrilateral. The upper pair rather detract from the mask-like appearance of the carapace, being wider apart and rather too high up to suit for eyes or spectacles to the mask.

The carapace is 32 mm. long by 26 mm. in greatest breadth, the front with a rather deep notch in the centre, thence sloping with a faint emargination to the orbits, in which the upper margin has two little unequal notches, the smaller near the outer tooth, while below the pterygostomian region is produced into an escutcheon-like piece, not spinose as in *Corystes*, its apex reaching rather beyond the front of the carapace, giving the appearance of a prolonged orbit, though only the base belongs to the little narrowly-ending eyes, and the mouth is blocked by the hairy basal joints of the second antennae. Of the teeth on the antero-lateral margin the fifth is about as large as the second, both are smaller than the third and fourth, and all four are acute. The upper part of the branchiostegite, the proximal parts of the legs, and a line across the sternum between the second and third pairs of legs are densely hairy. The second antennae are 24 mm. long, or possibly rather longer. The chelipeds are 37 mm. long. The female being apparently as yet unknown, it cannot be said whether these limbs show any sexual distinction parallel to that in *Corystes*. The fourth

joint is shorter than the sixth, hirsute along two edges, the fifth has a prominent tooth, the sixth on the right limb has the thumb shorter than the trunk of the joint, on the left limb scarcely shorter, in both with an acute apex and an irregularly denticulate or tuberculate margin, the teeth or tubercles along the finger more or less fitting the interstices along the thumb. In the four following pairs of limbs the sixth joint is very short and apically narrow; all the joints have hairy fringes, but on the seventh the single fringe is continuous nearly to the apex along the convex margin only in the last pair, in the three preceding pairs being limited to a short proximal space.

OXYRRHYNCHA.

Fam.: Maiidae.

1895. *Maiidae*, Alcock, Materials for a Carcinological Fauna of India, No. 1, p. 160.

Gen.: Dehaanius, M'Leay.

1834. *Acanthonyx* (part), Milne-Edwards, Hist. Nat. Crust., vol. 1, p. 342.
1838. *Dehaanius*, M'Leay, in Smith's Illustrations of the Zoology of South Africa, Annulosa by W. S. M'Leay, p. 57.
1839. *Dehaanius*, de Haan, Siebold's Fauna Japonica, Crust., part 4, p. 83.
1843. *Acanthonyx*, Krauss, Die Südafrik. Crust., p. 47.
1852. *Dehaanius*, Dana, U. S. Expl. Exp., vol. 13, part 1, p. 79.
1879. *Dehaanius*, Miers, J. Linn. Soc. London, vol. 14, p. 650.
1886. *Dehaanius*, Miers, Challenger Brachyura, Reports, vol. 17, part 49, p. 39.

Carapace sub-quadrate between the antero-lateral lobes and the trilobed hind margin, rostrum bifid, praeocular tooth prominent, postocular small. Pleon, in the male, seven-jointed. Eyes small, mobile. Base of second antennae slightly dilated at the middle, distally narrowed. Third maxillipeds having the third joint narrow at the base, then wide, the tubercular inner margin leading to a rounded apical lobe, the shorter fourth joint similarly produced, but with the truncate apical part forming a squared lobe, partially folded beneath the rounded one, but not reaching its inner edge; to the inner edge of the squared lobe is attached the fifth joint, which is widest distally, while the two following joints are more conical. The exopod has the outer

margin bluntly angled, the inner near the apex produced inward into a tooth. Chelipeds not large in either sex, fingers acute, not leaving an interspace when closed. The four following pairs of trunk-legs not long, subchelate, the sixth joint having a prominence near the middle, and the finger which is strong and acute curving towards it.

This genus is near to *Acanthonyx* Latreille (1829) in which the pleon is six-jointed, and to *Pugettia* Dana (1851) in which the trunk-legs are not subchelate.

DEHAANIUS DENTATUS (Milne-Edwards).

1834. *Acanthonyx dentatus*, Milne-Edwards, Hist. Nat. Crust., vol. 1, p. 343.

1838. *Dehaanius acanthopus*, M'Leay, Zool. South Africa, Annulosa, p. 58, pl. 3, f. a, b, c.

1843. *Acanthonyx dentatus*, Krauss, Die Südafrik. Crust., p. 48.

1879. *Dehaanius acanthopus*, Miers, J., Linn. Soc. London, vol. 14, p. 650.

1886. *Dehaanius dentatus*, Miers, Challenger Brachyura, Reports, vol. 17, part 49, p. 39.

The sides of the carapace are produced outward each into two triangular teeth; the anterior is the larger and extends forward; between them there is sometimes a small blunt process. The surface of the carapace is rather flat, but with various small prominences. The horns of the rostrum are subacute, rather wide apart; on their bases there are several hooked spines, serrate on the inner margin, but these instruments for retaining extraneous objects are inconspicuous compared with the club-like tubules which occupy every prominence. In the pleon of the female there are faint indications in the broad composite segment of the fourth, fifth, and sixth segments, its constituents.

The eyes, which are darkly pigmented, have a minute projection of the eye-stalk above the oval cornea.

The longitudinally folded first antennae have numerous plumose setae on the first joint, which is distally narrowed; the third joint is distally widened, one flagellum 10-jointed, very thick at the base, the other slender, 4-jointed. The second antennae have two joints of the peduncle free, cylindrical, the flagellum slender, pellucid, 7-jointed.

The chelipeds have on the fourth joint a line of tubercles and nearly parallel to this a blunt ridge, on the fifth joint two divergent ridges, one of them tuberculate; the thumb and finger are rather shorter than the trunk of the hand and have each from seven to nine teeth on the opposing edges. The

following trunk legs are more or less dorsally carinate, the ridge seeming to be sharpest on the fifth joint. The fingers are spinulose on the concave margin as far as the nail, which is horny-looking and smooth.

Krauss describes and figures *Acanthonyx macleayii* as without a tooth at the outer angle of the ophthalmic orbit and as having the two lateral teeth of the carapace widely distant, and *Acanthonyx quadridentatus* with four teeth on each side of the carapace. Miers retains these in the genus *Acanthonyx*, although they both have a seven-jointed pleon, which appears to be the chief, if not the only, distinction of *Dehaanius* from *Acanthonyx*. A question remains open whether these two species may not be mere variations of *Dehaanius dentatus*. Krauss reports them all from the rocky coasts of Natal, describing *Macleayii* as dull reddish-brown, 7 lines long; *dentatus* as red-brown, 3.2 lines; *quadridentatus* yellowish-brown, 5.7 lines. The specimens from Algoa Bay, dredged between Bird Island and the mainland, at a depth of 10-16 fathoms, on a bottom of sand and shells and stones, were of various sizes, the largest nearly 11 lines long from tips of rostrum to hind margin of carapace. They also vary much in colour markings, one of the largest being all over of a lively red, except for a dot of white near the middle of the carapace, and another near the end of the pleon, and the tips and teeth of the fingers, which are yellowish. Another large specimen has two white blotches above and several below. Some of the specimens are marbled with red and white, one or the other being more predominant, in one specimen the red almost disappearing, so as to leave a yellowish-brown effect.

All the specimens were more or less coated with algae, hydroid zoophytes, and other foreign substances, among which in one instance a small amphipod was found nestling. The extraneous organisms were principally attached near the rostrum, but in many cases the whole external surface of the body, including the third maxillipeds and the pleon, is coated with outgrowths such as those described by Dr. Graeffe for *Pisa armata* (Bolletino Soc. adriatica sci. nat. in Trieste, vol. 7, 1882), and by Sars for "*Scyramathia Carpenteri*" (1885). Besides the tubules of different lengths with thickened ends, on the projecting point in the sixth joint of the walking-legs there are groups which differ from the others in having acute apices. Almost everywhere are found outgrowths which are short, broad, and flattened. To these the midrib, which is common to all, gives a leaf-like appearance, but their normal condition appears to be not flattened but inflated, and they are perhaps essentially the same in structure as the tubules,

or even stages in the growth of the tubules. It may be worth noticing that these outgrowths are coloured in agreement with the part from which they spring. The two largest specimens, which were of a more uniform red than most of the others, also had the carapace and the limbs dorsally almost free from outgrowths, though in parts there were indications of their coming to development. From this it may be surmised that the tubules and leaf-like appendages are lost at the exuviation and have to be grown afresh. Dr. Graeffe considers that they may be auxiliary to respiration as well as facilitating the adhesion of algae and other substances.

OXYSTOMATA.

Fam. : Calappidae.

1896. *Calappidae*, Alcock, Materials for a Carcinological Fauna of India, No. 2, p. 136.

Gen.: Mursia, Desmarest.

1825. *Mursia*, Desmarest, Considérations générales sur la classe des Crustacés, p. 108, footnote.
1829. *Mursia*, Latreille, Le Règne Animal, Cuvier, nouv. éd., v. 4, p. 39.
1837. *Mursia*, de Haan, Siebold's Fauna Japonica, Crustacea, p. 70, and p. xviii. (1849).
1837. *Mursia*, Milne-Edwards, Histoire Naturelle des Crustacés, v. 2, 109.
1839. *Thealia*, Lucas, Ann. Soc. Entom. France, ser. 1, v. 8, p. 577.
1852. *Mursia*, Dana, U.S. Exploring Expedition, v. 13, p. 391.
1886. *Mursia*, Miers, Challenger Brachyura, Reports, v. 17, p. 290.
1896. *Mursia*, Alcock, Journ. Asiatic Society of Bengal, v. 65, pt. 2, p. 148.

Desmarest, who compares the genus with *Hepatus* and gives a distinguishing feature, says that the generic name had been adopted in the museum collection by Latreille from Leach. But, according to Miers, Leach's manuscript name was *Murcia*, and referred to a neighbouring genus afterwards defined as *Cycloës* by de Haan, and as *Cryptosoma* by Brullé and by Milne-Edwards, both names being published in 1837. Latreille in 1829, though accepting *Mursia* in Desmarest's sense, thinks that it ought to be changed as too near to another sub-genus of crustaceans, *Nursia*.

MURSIA CRISTIMANUS, de Haan.

1825. *Mursie Mains-en-crête*, Desmarest, Consid. gén. Crust., p. 431, t. 9, f. 3.
1837. "*Mursia cristimanus*, Desmarest," de Haan, Fauna Japonica, Crust., p. 70.
1837. *Mursia cristiata*, Milne-Edwards, Hist. Nat. Crust., v. 2, p. 109.
1839. "*Mursia cristimana*, Latreille," de Haan, Fauna Japonica, Crust., p. 73, t. 13 (mouth-organs).
1840. *Mursia custata*, Milne-Edwards, Hist. Nat. Crust., v. 3, p. 627 (index).
1843. "*Mursia cristimana*, Latreille," Krauss, Südafrik. Crust., p. 52.
1848. *Cryptosoma orientis*, Adams and White, Samarang Crustacea, p. 62, t. 13, f. 4, var. (?) Miers.
1882. *Mursia cristata*, Studer, Abhandl. k. Akad. Wiss. Berlin, Crustaceen der Gazelle von Westafrika, p. 15.
1886. *Mursia cristimana*, Miers, Challenger Brachyura, Reports, v. 17, p. 291.

Latreille in 1829 does not mention the specific name of this species, which Desmarest had left vague by giving it only in French. It may no longer be possible to decide the question of priority between de Haan and Milne-Edwards, their respective works having both been published in 1837, but, that being the case, it would be absurd to give such a form as *cristiata* preference over *cristimanus*. The opportunity for correcting *cristiata* into *cristata* in 1840 was evidently thrown away by the printers, who turned it into *custata*. The original *cristimanus* should not be disfigured into *cristimana*.

Studer, who had under observation a specimen taken from a depth of 50 fathoms at the entrance to Table Bay, says that the animal when alive was bright reddish brown with purple-red tubercles. The colour of the tubercles is moderately persistent, to judge by the specimens sent me, one from False Bay, found in trawl, the other from "South of Saldanha Bay, 33° 14′ 36″ S., 18° 2′ 12″ E."

ANOMALA.

1893. *Brachyura anomala*, Stebbing, History of Crustacea, Internat. sci. ser., v. 74, p. 133.

Of the two legions, Drominea and Ranininea, into which this group is divided, the former corresponds with "The Brachyura Primigenia or Dromiacea" of Alcock (Journ. Asiatic Society of Bengal, vol. 68, pt. 2, No. 3, p. 123, 1899).

In Major Alcock's paper, which was read Nov. 1st, 1899, and did not reach me until after my own manuscript had been sent to South Africa, will be found references to all the important papers on this section, by de Haan, Boas, Bouvier and others, together with full definitions and discussion of the various divisions and sub-divisions. The Dromiacea are divided by Alcock into two tribes, the Dromiidea and Homolidea, the former comprising three families, the Homolodromidae, Dynomenidae, and Dromiidae.

Fam.: Dromiidae.

1899. *Dromiidae*, Alcock, Journ. Asiat. Soc. Bengal, vol. 68, pt. 2, No. 3, p. 135.

Alcock supplies a valuable key to the genera which he accepts, but he reduces *Dromidia*, *Cryptodromia*, and *Petalomera* to the rank of sub-genera of *Dromia*, on the ground that "they are all linked together by intermediate forms." On this principle, as it seems to me, we only need a complete knowledge of zoology to reduce the whole animal kingdom to a single species—or a very few.

From Major Alcock's paper I may add two more references to the synonymy of the genus *Pseudodromia*, namely:—"Ortmann in Bronn's Thier Reich V. ii., Arthropoda, p. 1155," and "*Homalodromia*, Miers (*nec* Homolodromia A. M. Edw.), Zool. H.M.S. *Alert*, p. 553."

Gen.: Pseudodromia, Stimpson.

1858. *Pseudodromia*, Stimpson, Pr. Acad. Nat. Sci. Philad., Dec., Prodromus, pt. 7, p. 64.

1888. *Pseudodromia*, Henderson, Challenger Anomura, Reports, v. 27, p. 15.

Carapace longer than broad, convex, pubescent. Facial region more than half the width of the carapace. Epistome not joined to the front; palate with an elevation on each side. Sternal sulci in the female not reaching the segment which bears the chelipeds, convergent but not apically coalesced. Chelipeds with calcareous apices. The second to the fifth pairs of trunk-legs simple, fourth the shortest, fifth the longest.

It should be noticed that this genus makes an exception to the character assigned by Dr. Henderson and other writers to the Dromiidea and the family Dromiidae, according to which the fifth trunk-legs are small and short. In this genus, as Dr. Henderson himself observes in his generic description, they are longer even than those of the second pair. The

same writer points out as a misconception on Stimpson's part, the statement that "the abdomen is but slightly indurated posteriorly." Stimpson's remark appears to apply to the carapace, not the abdomen, but in neither part is it appropriate to the adult animal. In an Indian species Dr. Henderson found the sternal sulci of the female approximate, ending in a double tubercle, but in the female of the type species these sulci are apically separated by a narrow elevation of the sternal surface, which might be called a tubercle, but which certainly lies between the sulci.

Pseudodromia latens, Stimpson.

1858. *Pseudodromia, latens*, Stimpson, Pr. Acad. Nat. Sci. Philad., Dec., Prodromus, pt. 7, pp. 64, 78.
1888. *Pseudodromia, latens*, Henderson, Challenger Anomura, Reports, v. 27, p. 16, t. 1, f. 8.

The tridentate rostrum would be a conspicuous feature of this species, were it not that the hairy covering is apt to obscure the down-bent central tooth and the upper forward-pointing lateral teeth. The carapace has a smooth surface, more or less coated with a fine down ; there is a depression on each side at the cervical groove, which, as Dr. Henderson points out, receives the fifth joint of the fifth pair of trunk-legs. These, when lying on the back, form a strong geniculation between the fourth and fifth joints, and yet with their apices reach the front of the carapace.

The lobes of the lower lip are oval, with a flattening of the inner margin. The mandibles are elongate, the cutting edge broad, convex, not dentate, the outer surface of the plate convex, the inner thickened at a distance from the front margin, with a strong process rising over the base of the much bent palp. The first maxillae have the inner plate very broad at about the middle, the well fringed margins then converging rather sinuously to a blunt apex carrying about half a dozen horny spines ; the next plate widens to a distal border carrying fourteen horny spines besides others of slighter build ; the outer section has a flask-shaped first joint, surmounted by a bent ligulate second. The second maxillae have the innermost plate broadly oval, with two fringes of long feathered setae, the next plate shorter and much narrower, the third widening distally cleft from near the middle, the outer lobe being the longer and wider ; the outer section is produced into a narrow tongue tipped by one seta ; the flabellum, which has all the free margin closely fringed, is narrowly rounded above, broadly and obliquely truncate below. In the first maxillipeds the expanded

second joint is oblong oval, considerably longer than the first; the following joint is long and narrow, with a strong twist, its slightly notched apex reaching a little beyond the first joint of the geniculate exopod; the epipod is large, triangular, broad at the base and for two-thirds of the length. In the second maxillipeds the first three joints are short, the fourth is much longer, narrowing distally, shorter than the first joint of the geniculate exopod, but subequal to the combined fifth, sixth and seventh joints, which fold closely against it, the rounded seventh carrying among others several strong horny spines; the narrow epipod is accompanied by a branchia. The third maxillipeds have the third joint broad, rather longer than the fourth, carinate on the inner surface, the inner margin thickly fringed with a mass of hairs or setae; the fourth joint wide at the base, but narrow at the apex, at which the fifth joint is attached, this and the two following narrow setose joints folding closely against the fourth and upper part of the third; the first joint of the geniculate exopod reaches nearly to the middle of the carinate outer margin of the fourth joint of the main stem; there is a slender branchia. The chelipeds have the fifth and sixth joints densely pubescent on the outer surface, but the thumb and finger clean; the thumb has the margins shallowly dentate, and the apex bifid, the blunt tooth of the finger closing into the cleft. Dr. Henderson mentions that the fingers of the second and third trunk-legs have "two yellow spines on the under surface of their proximal half," and that the sixth joint of the fifth pair "gives rise to two minute curved spines which oppose the dactylus." These I have not been able to observe, but only a yellow spine or two on the distal half of the fingers.

The pleon is seven-jointed in both sexes, narrow in the male, with several of the segments indented and in parts strongly pubescent, broad in the female, trilobed, pubescent in parts of the surface, strongly fringed on the borders; the telson is triangular, with convex sides. In the female, the first pleopods are small, uniramous, cylindrical, apparently seven or eight-jointed, but the articulation very indistinct. The next four pairs are biramous, the outer branch long, laminar, the first joint curved, narrowest at the two ends, inner surface concave, longer than the remaining joints together, these being flat, eight to ten in number, successively narrowing, the whole branch fringed with long plumose setae, more densely on the outer than the inner margin; the inner branch cylindrical, narrow, of twelve or fourteen joints, of variable length, carrying long setae, chiefly

on the distal half of each joint. When the pleon of the female is distended with a multitude of eggs, the outer rami of these pleopods, especially those of the second and third pair stand out from the segments clasping round the brood. A little process close to each basal angle of the telson appears to represent the uropods.

Of the specimens sent me from the Cape one is a male, obtained from a depth of 30 fathoms in False Bay. When it arrived it was still tightly embedded in a mass of what I suppose to be the compound ascidian, *Goodsiria placenta*, Herdman. This covering perhaps assisted to preserve the colouring, which is a pinkish red, produced by a plentiful sprinkling of dots of various sizes so coloured upon a lighter ground; the fingers of the chelipeds are red with lightish tips; the eyes are brown on red stalks. The female specimen, of which the mouth-organs and pleon have just been described, had lost all colour.

The carapace of the male measured 29 mm. in length by 22.5 mm. in breadth. It is, therefore, much larger than the males described by Stimpson and Henderson. The carapace of the female was 23 mm. long by 17.5 mm. broad.

MACRURA.

Fam.: Parapaguridae.

1882. *Parapaguridae*, S. I. Smith, Bull. Mus. Comp. Zool. Harvard, v. 10, No. 1, p. 20.
1888. *Parapaguridae*, Henderson, Challenger Anomura, Reports, v. 27, p. 85.
1892. *Parapaguridae*, Ortmann, Zoologische Jahrbücher, v. 6, p. 269.

By S. I. Smith this family is distinguished from the Paguridae only by the circumstance that the gills are trichobranchiate instead of phyllobranchiate. Henderson, who adds as a characteristic the fact that the species appear to occur only in deep water, explains that "the gills are modified trichobranchiae, each consisting of a central stem which gives rise to two collateral rows of rounded filaments, gradually decreasing in size towards the apex, whereas in the Paguridae the stem gives rise to two rows of flattened leaflets."

In *Parapagurus dimorphus* the mid-rib of the gill gives rise to two rows of flattened leaflets, which at about the middle divide into two unequal rounded filaments, thus producing what Milne-Edwards and Bouvier speak of as quadriserial

trichobranchiae. The gills are in fact phyllobranchiate at the base and trichobranchiate above. As the filaments become shorter and less crowded towards the apex of the gill, they are also less flattened.

Ortmann in 1892 proposes to refer *Parapagurus*, the typical genus, to the Paguridae, allotting *Pylocheles* and *Chiroplatea* to the Parapaguridae. But in such a classification it is obvious that the name Parapaguridae would need to be changed.

GEN.: PARAPAGURUS, S. I. Smith.

1879. *Parapagurus*, Smith, Trans. Connecticut Academy, v. 5, pt. 1, p. 50.
1882. *Parapagurus*, Smith, Bull. Mus. Comp. Zool., Harvard, v. 10, No. 1, p. 20.
1888. *Parapagurus*, Henderson, Challenger Anomura, Reports, v. 27, p. 85.
1893. *Parapagurus*, A. Milne-Edwards and Bouvier, Mem. Mus. Comp. Zool., Harvard, v. 14, No. 3, Paguriens, p. 26.
1893. *Parapagurus*, Stebbing, History of Crustacea, p. 166.

Rostrum inconspicous, pleon spiral. Ocular peduncles not very long, the scales wide apart. First antennae, third joint of peduncle elongate, reaching much beyond the eyes. Third maxillipeds wide apart at the base. Right cheliped the larger. Second and third legs little distant at their bases, elongate, with long curved fingers. Female with the sexual orifice only on the left limb of the third pair. Fourth legs imperfectly chelate, fifth minutely chelate or sub-chelate. First and second pleopods, in the male, pairs, uniramous, sexual ; in the female, first wanting, second biramous, on the right side wanting. Third, fourth, and fifth pleopods, on the right side wanting, on the left biramous, but one ramus rudimentary in all in the male, in the fifth pair in the female.

The branchiae are stated by Professor Smith to be eleven pairs, two each to the third maxillipeds and first three pairs of legs, the remaining three belonging to the fourth pair of legs. Professors Milne-Edwards and Bouvier found a rudiment of a flagellum on the palp of the first maxillae, but no vestige of one on the palp of the first maxillipeds. In *P.dimorphus* I can find no rudiment of such a flagellum in either of these appendages. They say in their description of the genus that the peduncle of the second antennae is longer than the carapace, but this is quite at variance with the measurements of *P.dimorphus* as well as with those given by S. I. Smith for *P.pilosimanus*, with which the French authors are also dealing.

Parapagurus dimorphus (Studer).

1883. *Eupagurus dimorphus*, Studer, Abhandl, k. Akad. Wiss., Berlin, for 1882, Crust. Gazelle, p. 24, t. 2, f. 11-12.

1888. *Parapagurus dimorphus*, Henderson, Challenger Anomura, p. 86, t. 10, f. 1.

1893. *Parapagurus dimorphus*, Milne-Edwards and Bouvier, Mem. Mus. Comp. Zool., Harvard, v. 14, Paguriens, p. 32.

Front with central convexity flanked by an obtuse tooth on either side, hind border of carapace acutely emarginate; there are tufts of fine hairs on the surface behind the cervical groove. Eye-stalks somewhat constricted in the middle, according to Studer carrying on the upper surface a narrow longitudinal row of little hairs, a feature which probably becomes more conspicuous with age, as in average specimens it is only with difficulty detected; the corneae are dilated, distinguishing this species from others as yet known. Ophthalmic scales short, with an apical tooth. First antennae with a tooth at apex of otolithic lobe, the actual apices of the first joint rounded, third joint almost clear of the eyes, distally widened, lower flagellum eight-jointed, about half as long as the upper. The peduncle of the second antennae scarcely reaches beyond the eyes; the acicle is bordered with a dozen teeth and some slender hairs. The elongate mandibles have the third joint of the palp much longer than the first or second. The third maxillipeds; the sternum separating them has two median forward pointing teeth; the third joint is oblong, bordered with (22) very unequal teeth, of which three are considerably larger than the rest; the fourth joint is narrow at the base.

The left cheliped is small, rather hairy, the thumb in line with the trunk of the hand or nearly so, and the finger lying close to the thumb. The right cheliped in the male is greatly elongate, fourth joint on inner side with tuberculate ridge apically rounded, fifth and sixth covered with tubercles, larger ones forming a ridge on inner side of fifth and on both sides of sixth; a fine down coats parts of these joints, chiefly the outer surface; the thumb is shorter than the trunk of the sixth joint, from which it bends slightly away; the carinate, tuberculate finger more or less adapts the irregular tubercles of its inner margin to the intervals between those of the thumb, but there is sometimes a gap left, as shown by Studer, probably, as explained by Dr. Henderson, a character of advanced age. In the female the right cheliped is less elongate, much less strongly tuberculate, and without a thumb, the sixth joint not being sufficiently

produced to lose the effect of a rhomboidal termination ; the sharply carinate finger fits closely and exactly to the oblique finely tuberculate distal margin of the sixth joint. The third legs are slightly longer than the second, the finger about as long as the fifth and sixth joints combined, longitudinally grooved on both sides, fringed with short fine hairs. The fourth legs are surrounded with long plumose hairs, the fourth joint little longer than the fifth or sixth, which are both broad, the inner margin of the sixth joint coated with subcircular scales, the apex projecting but little in opposition to the rather long slender curved finger, which has a close-set row of teeth following its curve and setae on both margins. The fifth legs likewise have long fringes of serrate setae, the sixth joint squamose distally behind the finger hinge, the very small thick finger covered with long setae, closing down upon the short almost transverse palmar margin. Of *P. pilosimanus*, Smith, the French authors say that the fourth legs are provided with an almost perfect chela (pince), and that in the fifth legs the chela is narrower but longer, the palmar portion being much more elongate than the digital portion, but this latter statement may only mean that the sixth joint is much longer than the seventh.

The sixth segment of the pleon is almost completely calcified dorsally. The uropods on the left are the larger. The infolded telson is obliquely oval, with numerous little spine teeth at and near the apical margin.

Specimens in formalin retain for some time red markings, almost all longitudinal, on body and limbs and on the eye-stalks, the eggs a deep-red when first the mother is withdrawn from a shell. The "Gazelle" specimens were in shells of *Buccinum porcatum*, Gm., completely covered with colonies of *Epizoanthus cancrisocius* v. Martens. Henderson reports the species from the neighbourhood of Nightingale Island, Marion Island, the coast of Patagonia, as well as from the Agulhas Bank. The specimens here described were taken 34° 43′ 15″ S., 18° 31′ E.

The greatest depth recorded for this species is 245 fathoms, off Port Churruca, Patagonia (Challenger).

Fam.: Palinuridae.

Gen.: Palinurus, Fabricius.

1798. *Palinurus*, Fabricius, Supplementum Entomologiae Systematicae, p. 400.

1884. *Palinurus* (sensu restricto), T. J. Parker. Trans. New Zealand Institute for 1883, v. 16, p. 304.

1888. *Palinurus* (sensu restrictiore), Bate, Challenger Macrura, Reports, v. 24, p. 84.

1891. *Palinurus*, Ortmann, Zool. Jahrb., v. 6, p. 14.

In establishing this genus in 1798 Fabricius divided it into two sections, the first having the ocular spines simple, the second having those spines dentate beneath. In the second section he placed only the species *Palinurus quadricornis*, a new name for what he and Herbst had previously called *Astacus elephas*. This has since been adopted as the type of the genus under the name *Palinurus vulgaris*, Latreille, which ought perhaps rather to be called *Palinurus elephas*. Pennant in 1777 called this species *Astacus homarus*, confounding it with the Asiatic *Cancer Homarus* of Linnæus.

In 1884* T. J. Parker also divided the genus into two sections, containing numerous species, distributed over three sub-genera. The first of these sections, the "Silentes," contained the sub-genus *Jasus*, and was defined as having, "stridulating organ absent; rostrum well developed, clasped by paired pedate processes of the epimeral plates; procephalic processes present; coxocerites imperfectly fused; antennulary flagella short." The species included *lalandii*, Milne-Edwards; *edwardsii*, Hutton; *hügelii*, Heller. Of these Ortmann considers that *edwardsii* is a synonym of *lalandii*. *Jasus lalandii*, though its specific name was given by Lamarck, appears to have been first described by Milne-Edwards. Dr. Gilchrist informs me that this species is common at the Cape, grows to a large size, and is commercially valuable.

The second of Parker's sections was designated "Stridentes," and distinguished as having "stridulating organ present; rostrum variable, but rarely (? never) as well developed as in A [Section of the Silentes]; pedate clasping processes absent; procephalic processes absent." This section was divided into two sub-sections, the first containing the sub-genus *Palinurus*, and having "Antennulary sternum narrow below and bases of antennae consequently approximated; bases of antennules hidden, in a view from above, partly by the antennulary sternum, partly by the antennae; coxocerites imperfectly fused; antennulary flagella short." The sub-genus contained "*Palinurus vulgaris*," in which the rostrum is reduced to a small spiniform tubercle, with the ophthalmic segment uncovered, and *Palinurus trigonus*, de Haan, in which the rostrum is well developed, covering the ophthalmic segment. This latter species had, however, already been made the type of *Linuparis*, White, 1847. Parker's second sub-section was opposed to the first by having "Antennulary sternum broad below, causing a wide separation of bases of antennae; bases of antennules visible

* See also Nature, v. 29, p. 190, 1883.

in a view from above; rostrum absent; ophthalmic segment uncovered; coxocerites perfectly fused; antennulary flagella long." This suffices to define the sub-genus *Panulirus*, White, 1847, which contains several more or less well-known species, such as *penicillatus*, Olivier, and *argus*, Latreille.

The sub-genera above-mentioned are now accepted as genera. Of two species *P.longimanus*, Milne-Edwards, and *P.frontalis*, Milne-Edwards, Parker could not say whether they should come under *Jasus* or the restricted *Palinurus*. Ortmann decides that the Chilian *frontalis* is a synonym of *lalandii*, and that the West Indian *longimanus* with its variety from Mauritius properly belongs to *Palinurus*. Parker makes the following observation on the distribution:— "Leaving these two species aside, it is worthy of remark that all the species of *Jasus* are confined to the Southern Hemisphere (Ethiopian and Australian Regions), and those of *Palinurus*, as restricted above, to the Northern Hemisphere (Palaearctic Region), while those of *Panulirus* occur in both hemispheres, and, as far as I can make out, in all the zoogeographical regions." This generalization, however, will not hold in regard to *Palinurus*, being opposed both by the var. *Mauritianus* of *P.longimanus*, described by Miers in 1882, and by the new species from the Cape here described.

Palinurus Gilchristi, n. sp.

Plate 1.

With the so-called *Palinurus vulgaris* from the northern hemisphere, this southern species shows a close relationship. The rostral spine is, in accordance with the generic character, very small. The large ocular spines are smooth on the upper (or hinder) margin, but have from four to five teeth on the lower (or front) margin; they are followed by three successively much smaller spines, these rows extending to the cervical groove. The large spines on the outer sides of the eyes are followed each by a couple of spines, these rows being much less considerable than in *Palinurus vulgaris*. The rest of the ornamentation differs by its greater compactness in the new species, two median rows, each consisting of three prominent spines very close together, running nearly parallel to one another to the cervical grove, whereas in the species compared such spines are wide apart in convex lines. Behind the cervical groove there are numerous tubercular spines, two median rows of which are very close together to start with and converge to the hind rim of the carapace. The sternum is strongly tuberculated, but with the pear-shaped bulb at its apex quite smooth. In the pleon the second to the

fifth segments have the transverse furrow interrupted in the centre by a very low, discontinuous carina. On the sixth segment two median tubercles precede the furrow. The second to the sixth segments have their sides produced to a tooth, though it is far smaller than in *Palinurus vulgaris*, as are also the denticles to the rear of it. The postero-lateral angle of the first pleon segment rests on a slight smooth depression of the antero-lateral margin of the second segment, the corresponding part in *P.vulgaris* being not smooth but dentate.

The eyes are dark, the stalk grooved below the facetted portion, but without the widening towards the base, which is conspicuous in *P.vulgaris.* Both pairs of antennae appear to agree closely with those of that species.

The first pair of trunk-limbs are slightly shorter and only moderately stouter than the others ; the third joint has two tubercles on its inner margin, the fourth joint or arm has on the inner margin 5 teeth, of which the subapical one is rather large ; its outer and lateral keels are smooth, not acute, but each ends in a sharp tooth ; the fifth joint has a smooth outer margin, produced to a rounded apex ; the sixth joint has a sharp subapical tooth on the inner margin ; the finger, which is not much shorter than the sixth joint, is longitudinally grooved, and carries several tufts of short setae. The following pairs of limbs are slender and subequal, but contrary to what is the case in *P.vulgaris*, in the fifth pair the two joints preceding the finger are together slightly longer than in the preceding limbs.

The colour of this pretty species is orange, banded with yellowish white on the antennae and limbs, nearly uniform on the carapace, but transversely striped with yellowish white on the pleon, the light colour predominating at the sides, and also dividing the transverse furrow on the pleon segments along the raised ridge. The length of the larger of two male specimens sent me is about 170 mm. or $6\frac{3}{4}$ inches, from rostrum to end of the telson.

Palinurus longimanus is distinguished both from the present species and from *P.vulgaris* by having teeth on both margins of the ocular spines, and the first trunk-legs much longer than the second.

Of the new species, for which I do myself the pleasure of using Dr. Gilchrist's name, the larger specimen was taken in False Bay, the smaller was trawled 25 miles s.w. $\frac{1}{4}$ w. from Cape St. Blaize.

Fam.: Nephropsidae.

Gen.: Astacus, Leach.

1814. *Astacus*, Leach, Edinb. Encycl., vol. 7, p. 398.
1815. *Astacus*, Leach, Trans. Linn. Soc. London, vol. 11, p. 343.
1816. *Astacus*, Leach, Encycl. Brit., Art. Annulosa, p. 420.
1819. *Astacus*, Leach in Samouelle's Entomologist's Useful Compendium, p. 95.
1825. *Astacus*, Desmarest, Consid. gén. Crust., p. 209.
1829. *Astacus*, Latreille, Le Règne Animal, vol. 4, p. 88.
1837. *Homarus*, Milne-Edwards, Hist. Nat. Crust., vol. 2, p. 333.
1847. *Homarus*, White, List of Crustacea in Brit. Mus., p. 72.
1850. *Astacus*, White, List of British Animals in Brit. Mus., Crust., p. 35.
1852. *Homarus*, Dana, U.S. Expl. Exp., vol. 13, part 1, p. 523, part 2, p. 1558.
1853. *Homarus*, Th. Bell, British Stalk-eyed Crustacea, p. 241 (part published not later than 1850, since it is quoted by White in that year).
1857. *Astacus*, White, Popular History of British Crustacea, p. 101.
1875. *Astacus*, Sowerby, Continuation of Leach's Malac. Podophth. Brit., text to t. 35.
1881. *Homarus*, Huxley, The Crayfish, Intern. sci. ser., vol. 28, p. 13, etc.
1888. *Homarus*, Bate, Challenger Macrura, Reports, vol. 24, p. 192.
1893. *Astacus*, Stebbing, History of Crustacea, Intern. sci. ser., vol. 74, p. 201.
1895. *Homarus*, Herrick, The American Lobster, Bulletin U.S. Fish Commission, p. 8.
1896. *Astacus*, Ortmann, Zoologische Jahrbücher, vol. 9, p. 429.
1896-7. *Homarus*, F. J. Bell, Annals and Magazine Nat. Hist., ser. 6, vol. 18, p. 476, vol. 19, Feb.
1897. *Astacus*, Stebbing, Annals and Magazine Nat. Hist., ser. 6, vol. 19, pp. 120, 353, 470.
1898. *Astacus*, Stebbing, Natural Science, vol. 12, p. 239.

Leach in his early restriction of the genus *Astacus* retained in it three species, the Common Lobster, the Common River Crayfish and the Norway Lobster. He presently separated from it the genus *Nephrops* for the last of the three, assigning the other two to separate sections of *Astacus*. But eventually he left the lobster alone in *Astacus*, forming a new genus *Potamobius* for the fresh water crayfish.

According to Huxley the most important distinction is presented by the podobranchiae, in which the stem (in *Astacus* and *Nephrops*) is, as it were, completely split into two parts longitudinally, one half corresponding with the lamina of the crayfish (*Potamobius*) gill, and the other with its plume. Ortmann expresses the same thing by saying that in the Nephropsidae the podobranchiae are not coalesced with the mastigobranchiae, and that in the *Potamobiidae* they are coalesced. Moreover, in the former family the last thoracic segment is firmly adherent to the rest, while in the latter family it is movable. In *Potamobius* the telson has a transverse division which is wanting in *Astacus* and *Nephrops*. Between the two latter, on the other hand, there are well marked distinctions. The branchial plume of the podobranchia of the second maxilliped is well developed in *Astacus*, but very small or absent in *Nephrops* (Huxley, The Crayfish, p. 281). The second antennae have a very small exopod in *Astacus*, but a large one in *Nephrops*, and the slender prismatic form of the front chelae which is characteristic of *Nephrops* is not shared by those of *Astacus*.

The species of *Astacus* sensu restricto at present known may be distinguished as follows:—

1. Rostrum with teeth on the under surface, 1. *A. americanus* (Milne-Edwards).
   Rostrum without teeth on the under surface, 2.

2. Front chelae not pubescent on outer surface, 2. *A. gammarus* (Linn.).
   Front chelae pubescent on outer surface, 3. *A. capensis*, Herbst.

Astacus capensis, Herbst.

1792. *Cancer* (*Astacus*) *capensis*, Herbst, Versuch einer Naturgeschichte der Krabben und Krebse, Bd. 2, Heft. 2, p. 49, t. 26, f. 1.

1803. *Astacus capensis*, Latreille, Hist. Nat. Crust., v. 6, p. 240.

1837. *Homarus capensis*, Milne-Edwards, Hist. Nat. Crust., v. 2, p. 335.

1841. *Homarus capensis*, de Haan, Fauna Japonica, Crust., p. 161.

1843. *Homarus capensis*, Krauss, Die Südafrikanischen Crustaceen, p. 54.

1878. *Homarus capensis* (?), Huxley, Proc. Zool. Soc. London, for 1878, p. 754.

1895. *Homarus capensis* (?), Herrick, The American Lobster, p. 8.

According to Herbst this beautiful Macruran is found at the Cape in mountain streams. It is, he says, very like the common European river Crayfish, but of more slender form, with an almost uniform breadth, the colour coral-red, with a fine polish like carnelian. What the colour might be in living specimens he had no means of deciding. He describes the arm or fourth joint of the front chelipeds as relatively small, the fifth as almost larger than the fourth and strongly tuberculate, the hands as large, with a margin very delicately raised and curved, and as everywhere coated with long, yellow, transparent hairs. He declares that all the four following pairs of feet have chelate apices, in contrast with the common river Crayfish, in which only the first two pairs are so constructed. This account agrees very well with the figure given on Herbst's plate. It agrees almost too well, suggesting a suspicion that the author wrote his description from the figure rather than from the specimen, for there is reason to suppose that the hands of the chelipeds have the long hairy coating only on the outer and not on the inner surface, and that the fourth and fifth pairs of trunk-legs are simple, not chelate.

Milne-Edwards in changing the name to *Homarus capensis* shows that he did not believe in the chelate character of the last two pairs of trunk-legs. He gives the description as follows:—Body slender. Rostrum flattened, much shorter than the peduncle of the outer antennae, and finely denticulate on the edges. Wrist granular, hands elongate, very compressed, furnished on the upper edge with a finely denticulate crest, and covered with hairs above. Length about 5 inches. The letters C M. appended to this description testify that Milne-Edwards had a specimen at his command. He goes on to say that the *Astacus scaber* of Fabricius, Supplem. p. 407, 1798, appears to be identical, Fabricius having, he thinks, been deceived as to the number of chelae both in this species and in the species subsequently known as *Nephrops norwegicus*. But this identification cannot be accepted. For *Astacus scaber* is described as having the rostrum short, subulate, acute, the back of the carapace in front spinose with two spines on each side larger and stronger than the rest, and the wrist of the front chelipeds short. To these distinctions must be added the fact that the habitat of the species is not South African but the Indian Ocean, and a little weight may be given to the circumstance that the author of the species assigns to it only a single pair of filiform chelipeds in addition to the large front ones. The account given by Fabricius is more easy to reconcile with Herbst's *Cancer modestus*, 1796, called *Eutrichocheles modestus* by Wood-Mason in 1895.

The only information supplied by de Haan is that, whereas the flagella of the palps of the third maxillipeds are ovate-oblong in *Homarus vulgaris*, they are elongate in "*Homarus capensis*, *Nephrops*, *Astacus*, *Axia*."

Krauss adds nothing to our knowledge of *Astacus capensis* except the negative evidence that he had never seen it in Natal.

Huxley, in "The Crayfish," p. 332, 3rd Ed., 1881, incidentally remarks that the genera *Homarus* and *Nephrops* "are exclusively confined to the northern hemisphere," a statement inconsistent with the existence of the little Cape Lobster, to which he here makes no allusion. In the proceedings of the Zoological Society, however, Huxley says:—"I must confess myself to be in a state of hopeless perplexity respecting the Crayfish or Lobster, which is said to occur at the Cape of Good Hope, *Cancer* (*Astacus*) *capensis* of Herbst," and as to Herbst's statement that all the legs are chelate he observes that "it is impossible to suppose that Herbst should have made a mistake on such a point as this." But mistakes are never impossible, and in regard to the presence or absence of minute chelae they are rather exceptionally easy to make, especially when only a dried specimen is examined.

Herbst quotes no authority for the declaration that his species lives in mountain streams, at which he would not have felt surprise, since on the one hand he probably regarded it rather as a crayfish than a lobster, and on the other hand he elsewhere speaks of lobsters living in the rivers in Chili. But the existence of fresh water lobsters still awaits corroboration. Of the two specimens, a male and a female, which I consider to be *Astacus capensis*, the male was labelled as coming from Table Bay, and more particularly described as having been "got in rock-pool at Sea Point, a village a few miles from Cape Town." Dr. Gilchrist subsequently took pains "to verify that it was found in a salt water rock-pool." The female was also from the Cape, but without more special indication of locality. The male specimen when first received in England retained plentiful traces of a rich red colouring. This unfortunately disappears in spirit. It is, however, a character which combines with the general proportions and the structure of the front chelipeds to produce conviction that this specimen and its companion belong to the species described by Herbst. That they belong to the species described by Milne-Edwards there can be no doubt, since they agree with his description at all points. Dr. Gilchrist in answer to my enquiries writes, "It

is certainly a mistake to say that it occurs in the rivers of the Colony, where so far as I can make out no such Crustacean occurs. I have learned that it is also found in Algoa Bay."

The small apical tooth of the rostrum reaches beyond the base of the third joint of the peduncle of the first antennae, the sides of the rostrum are serrate with five, six or seven points, all small and diminishing successively backward ; it is without teeth on the lower surface; on either side there is a small tooth a little way behind the margin of the orbit. The carapace, rostrum included, in the male is shorter than the pleon ; its sides and the back of the telson are hirsute and there are scattered hairs at various parts of the whole back; the female specimen is much less hairy than the male. The lower margins of the pleon segments are closely fringed with hairs, and they are shaped nearly as in *Astacus gammarus*, the common lobster. The telson is longer than broad, the slightly sinuous sides converging very little to the pair of denticles which flank the broad apical convexity. The short stout eyes, black in spirit, reach about half-way along the rostrum. The first antennae are about two-thirds the total length of the carapace, their two flagella nearly equal in length. The second antennae are as in *Astacus gammarus*, and when bent back reach the extremity of the body. The elongate hairy third maxillipeds differ a little from those of the species just mentioned in the marginal denticulation. In the chelipeds the fourth joint has a hairy fringe; the fifth besides being hirsute has three or four lines of tubercles, not all very regular or distinct; the sixth which is very much longer than broad, and is rather broader in the right limb than the left, besides the hairy covering on the outer surface which extends over the base of the thumb, has the outer margin delicately serrate, and the inner conspicuously; the thumb and finger of the larger chela are much shorter than the trunk of the joint, the bent apices crossing, the marginal teeth few and not bulky, hairs at the base of the thumb partly filling the cavity between it and the finger; in the narrower chela the thumb and finger are not much shorter than the trunk of the joint, nearly approximate, with many minute but unequal teeth and a long brush of hairs. The fourth and fifth legs have the finger subequal in length to that which assists in forming the chela of the second and third pairs, but it is less hairy. In the fifth pair there is a tuft of hairs at the apex of the sixth joint which in a dried specimen might go some way towards producing the false impression of a chela. This limb has a branchia as in the common lobster. In Huxley's "Crayfish," p. 265, there is a perplexing statement that "in the lobster, the solitary

arthrobranchia of the eighth somite disappears, and the branchiae are reduced to twenty on each side. In *Astacus* (*i.e.*, *Potamobius*, the crayfish) this branchia remains." From the adjacent formulae it is evident that not an arthrobranchia but a pleurobranchia is intended, and other writers have pointed out that the supposed disappearance is due to an oversight.

The pleopods in both sexes appear to agree closely with those of the common lobster. On the second, third, and fourth segments of the pleon there is a very small medio-ventral tooth in the male, but none in the female.

The colour (so far as known), the small size, the pubescence of the body and claws, and the flattened hands of the front chelipeds, will sufficiently distinguish this neat little South African species, less than four inches long and less than three-quarters of an inch broad, from the clumsier lobsters of the North.

Fam.: Callianassidae.

1888. *Callianassidae*, Bate, Challenger Macrura, Reports, v. 24, p. 27.

1893. *Callianassidae*, Stebbing, Hist. Crust., p. 183.

This family is included in the Thalassinidae by Dr. Heller in 1863. Kinahan in 1859, Haswell in 1882, and Dr. de Man in 1888 separate from it a family Gebidae or Gebiidae, which Ortmann in 1893 suppresses.

Gen.: Callianassa, Leach.

1813-14. *Callianassa*, Leach, Edinburgh Encyclopaedia, Art. Crustaceology, v. 7, p. 400.

1837. *Callianassa*, Milne-Edwards, Hist. Nat. Crust., v. 2, p. 307.

1863. *Callianassa*, Heller, Crust. des südlichen Europa, p. 201.

1870. *Callianassa*, Alphonse Milne-Edwards, Nouvelles Archives du Muséum, v. 6, p. 75.

1888. *Callianassa*, Bate, Challenger Macrura, Reports, v. 24, p. 28.

Since the revision of the genus by Professor Alphonse Milne-Edwards, referred to below, several new species have been described, as *C. Stimpsoni*, S. I. Smith, 1874; *C. Krukenbergi*, R. Neumann, 1878; the phosphorescent *C. Filholi*, A. Milne-Edwards, 1879; *C. madagassa*, Lenz and Richters, 1881; *C. mauritiana*, Miers, 1882; *C. Martensi*,

Miers, 1884; the doubtful *C. occidentalis*, Bate, 1888; *C. truncata*, Giard and Bonnier, 1890; the very large *C. diademata*, Ortmann, 1892; and in the same year Ortmann's var. *japonica* of *C. subterranea* (Montagu); the blind *C. caecigena*, Alcock and Anderson, 1894; *C. novae-britanniae*, Borradaile, 1899, from New Britain; and *C. lignicola*, Alcock, 1899, "obtained from burrows in the interior of water-logged mangrove-twigs."

Callianassa Kraussi, n. sp.

Plates, 2, 3.

The rostral point is short, the lateral teeth represented only by a faintly indicated angle on either side at some distance from the centre. The first and second segments of the pleon are membranous, rather indistinctly separated, the third, fourth and fifth are subequal, each shorter than the sixth, and each having on either side a tuft of hairs, and the middle of the hind margin obtusely produced, the sixth is distally narrowed, with a dorsal suture near the attachment of the uropods. The eye-lobes are contiguous, obtusely triangular, the eyes small. The first antennae are more than half as long as the second, the first joint rather longer than the eyelobes, the second longer than the first, the third than both combined, the fringing setae of both second and third very long, the lower flagellum 13-jointed, with long setae, the upper 17-jointed, a very little shorter, thickest near the end, with short setae. Second antennae much more slender, with shorter peduncle, and flagellum of more than forty joints.

The subquadrate distal end of the mandible is fringed with about 19 small unequal teeth; the third joint of the palp is longer than the second or the pentagonal first, and has a dense row of short hooked spines on and near the truncate apex. In the second maxillae the slender piece between the four setose plates and the respiratory fan has a twist at the apex which gives the appearance of an articulation. The third maxillipeds have the first and second joints very small, but the third abruptly broad at the rounded proximal end, thence widening to the obliquely truncate distal margin which nearly equals the length of the joint, and carries the still wider but considerably shorter fourth joint; at the outer extremity of the distal margin of this is attached the oval fifth joint, as long as the fourth but less than half as wide; the sixth joint is rather shorter than the fifth, but wider, its

inner margin greatly bulging both beyond the fifth joint and the narrowly oval finger ; all these joints are fringed with long setae.

Of the chelipeds or first peraeopods in the largest specimen the larger is on the right side, but on the left in the two smaller specimens. In the larger limb the third joint is narrow, having a serrate inner margin, the fourth is slightly shorter, proximally considerably broader, with its sinuous inner margin strongly serrate, devoid of the tooth present in many species ; the fifth is broad but longer than broad, equal to the sixth in breadth, but shorter than its total length, though longer than the trunk of it without the thumb ; the trunk of the sixth joint is nearly square, longer than the thumb but equal in length to the finger ; thumb and finger are a little separated at the base, setose on the outer and inner margins, the inner being in each tuberculate, in two series with a cavity between on the thumb, in one series along a sharp projecting lobe on the finger. The smaller limb has the third and fourth joints devoid of conspicuous serration, the fourth not bulging, the fifth about twice as long as broad, as long as the sixth, in which the thumb is longer than the trunk and together with the still longer finger is densely setose and on the inner margin tuberculate. The second peraeopods have extremely long setae on one margin of the fourth and fifth joints, the fifth widening distally, considerably longer than the setose sixth, of which the thumb is longer than the short trunk and a little shorter than the finger, finger and thumb acute, densely setose, forming a small but regular chela, the apices not curved for overlapping. In the third peraeopods the fourth joint has few setae, the fifth is distally widened and has some apical groups, while the sixth and seventh joints are covered with these ornaments ; what may be called the trunk of the sixth joint is a little wider than the fifth but not half as long, but it is produced backward in a great rounded lobe fringed with long curving setae, so that its entire length exceeds that of the fifth joint ; to its truncate extremity is attached the broadly triangular, densely setose, finger, which is little longer than broad. In the fourth peraeopods the fifth joint has a distal group of setae, but the sixth and seventh joints are so buried in them that the outlines of the joints are difficult to follow ; especially the sixth joint has on the breast at the distal half a closely set triangular group of serrate spine-like setae which appear to mark a short blunt prolongation of the joint ; this would give a kind of chelate antagonisn to the oval finger, which is scarcely half as broad and not half as long as the sixth joint. The fifth peraeopods are rather sub-chelate than chelate, a very small curved finger

closing down on a short, convex, transverse palmar margin of the sixth joint; this, which is about twice as long as broad, is except near the base immersed in very long setae, one group near the convex hind margin being exceptionally dense.

The branchiae are composed of leaflets so narrow that they may be regarded as something intermediate between phyllobranchiae and trichobranchiae.

The first pleopods have an S-shaped appearance, with many outstanding setae, the ramus about twice the length of the peduncle, a narrow membranous strip, with a widening at the bend (as seen without dissection). The second pleopods are biramous, both rami short, narrow, membranous, the outer seemingly the shorter. The three following pairs have broad rami, the outer the broader, with the outer and apical margin bordered with long feathered setae that look as if composed of numerous joints like an antennary flagellum; the inner ramus is narrower at the apex with similar but fewer setae.

The uropods extend beyond the telson, the outer ramus the larger, with the inner and upper margins straight and smooth, the outer and apical convex, densely fringed with long plumose setae, of which an additional curved series extends from the upper outer corner on the surface to near the centre of the ramus; the inner ramus is approximately oval, with long setae at the apex and on the lower part of the inner margin.

The telson is broader than long, with a small group of of setae near each corner of the nearly straight apical margin, the lateral margins sinuous, making the telson narrowest at the base and broadest at the middle.

In spirit the colour is a sort of ivory white.

The length of the largest specimen from rostrum to end of telson was 47 mm.

Habitat, Cape of Good Hope, Gordon's Bay, a little below high water mark.

Alphonse Milne-Edwards in his revision of the genus in 1870, divides the 17 species then known into two groups, the second distinguished by a short telson and comprising 7 species. Of these, 4 have a tridentate front, and of the remaining three which are devoid of latero-frontal teeth, one has the rostrum itself tridentate. There thus remain only two for comparison with the present species, namely, *C. Bocourti*, A. Milne-Edwards, which is distinguished by the strong rostral point, and *C. mucronata*, Strahl, in which the third joint of the first antennae is not elongate. Of species established since the above-mentioned revision, *C. mauritiana*, Miers, has the trunk of the sixth joint in the larger cheliped much larger than the fifth joint, as is also the

case in *C. Martensi*, Miers; *C. Krukenbergi*, Neumann; *C. madagassa*, Lenz and Richters; and *C. novae-britanniae*, Borradaile. In *C. occidentalis*, Bate, the trunk of the sixth joint is much broader than the fifth joint. In *C. Stimpsoni*, Smith, the fourth joint has a very prominent tooth near the base. *C. truncata*, Giard and Bonnier, founded on specimens attacked by parasites, is said to be approximate to C.laticanda, Otto. The large cheliped has a strong tooth on the fourth joint.

GEN.: UPOGEBIA, Leach.

1813-14. *Upogebia*, Leach, Edinburgh Encyclopaedia, Art. Crustaceology, v. 7, p. 400.
1815. *Gebia*, Leach, Trans. Linn. Soc. London, v. 11, pp. 335, 342.
1816. *Thalassina*, Risso, Hist. Nat. Crust., de Nice, p. 76.
1825. *Gebia*, Desmarest, Consid. gén. Crust., p. 203.
1826. *Gebios*, Risso, Hist. Nat. de l' Europe Mérid., v. 5, p. 51.
1837. *Gebia*, Milne-Edwards, Hist. Nat. Crust., v. 2, p. 312.
1841. *Gebia*, de Haan, Fauna Japonica, Crust., p. 162.
1852. *Gebia*, Dana, U.S. Expl. Exp., Crust., v. 13, p. 509.
1853. *Gebia*, Bell, Brit. Stalk-eyed Crust., p. 222.
1863. *Gebia*, Heller, Crust. süd. Europa, p. 204.
1880. *Gebia*, Boas, Studier over Decapodernes Slaegtskabsforhold, p. 82.
1882. *Gebia*, Haswell, Catal. Australian Crustacea, p. 164.
1884. *Gebia*, Sars, Archiv. Naturv., v. 9, pt. 2, p. 198.
1893. *Upogebia*, Stebbing, History of Crustacea, p. 185.
1893. *Gebia*, Ortmann, Decap. u. Schizop. Plankton-Exp., p. 49.
1900. *Upogebia*, M. J. Rathbun, Pr. U.S. Nat. Mus., v. 22, p. 308.

The definition of this genus is not at present very clear. According to a character usually given the anterior limbs of the trunk do not form a proper chela, there being great disparity of size between the movable finger and the tooth which does duty for a thumb. In 1868 Professor A. Milne-Edwards (Nouv. Archiv. Mus. Hist. Nat., v. 4, p. 64), founded the genus *Gebiopsis* to receive a species in which the anterior limbs are perfectly chelate, but both Miers in 1884 (Crustacea of "Alert," p. 282) and Ortmann in 1893 are disposed to give *Gebiopsis* only the rank of a sub-genus. Ortmann remarks that the comparative length of the fingers in the different species of *Upogebia* shows all possible gradations from fingers of equal length to a very abbreviated condition of the

immovable one. He is willing, however, to accept *Gebiopsis* as a sub-genus for those species which are without the small tooth on the antero-lateral margin of the cephalothorax (on a level with the eyes and just over the second antennae). This minute negative characteristic is shared, he says, by the species *nitida*, *darwini*, *intermedia*, and *isodactyla*, all of which appear to have the fingers of about equal length. But if the absence .of one spine justifies the sub-genus *Gebiopsis* for these species, then the presence of three spines would seem to demand another sub-genus for the *Gebia spinifrons* of Haswell, in the description of which we find the "anterior border, below the lateral frontal process, and behind the base of the antennae, with three prominent acute spines." In describing *Gebiopsis intermedia* Dr. de Man speaks of "the equally long fingers" of the chelipeds, but in the figures the immoveable finger is much the shorter (J. Linn. Soc. London, v. 22, p. 259, t. 16, f. 6, 7, 1888). Bell in his generic definition of *Gebia* says, "the hand elongate, imperfectly cheliform; the moveable finger large, turning down to the immoveable one, which is not half its length," and in his description of "*Gebia stellata*" states that it has "the moveable finger long and slender, extending far beyond the immoveable one," but immediately afterwards in his comparative description of "*Gebia deltura*" (which he regards as doubtfully distinct from *G. stellata*) he declares that it has "the fingers more nearly of equal length," and gives a figure in which the right cheliped might fairly well pass for perfectly cheliform. The *Upogebia littoralis* of Risso, which when adult has the tooth on the antero-lateral margin and the chelipeds imperfectly cheliform, is figured by Sars in the first postlarval form without the tooth and with the hands forming "a perfectly normal chela, in that both the fingers are of about the same length." The animal at this stage is, however, only 5 mm. long. But already its mouth-organs show a near approximation to those of the adult *Upogebia*, at least as seen in *Upogebia capensis* (Krauss). These also very closely agree with the figures given in Savigny's Crustacea of Egypt, t. 9, f. 3, for the species which Audouin doubtfully identified with "*Gebia stellata*," but which H. Milne-Edwards thought likely to require a new genus for its reception on the ground that it differed from species of *Gebia* proper by having the fingers of the chelipeds of equal length. As there is no indication in the figure of an antero-lateral tooth, this species will naturally fall to the *Gebiopsis* of Prof. Alphonse Milne-Edwards, if that is upheld either as genus or sub-genus. But there is no reason to expect that the mouth organs will help to strengthen its dintinction from the parent genus.

In his account of the first post-larval stage of *Upogebia littoralis*, Sars states that in the second antennae a five-jointed peduncle and a thinner multiarticulate flagellum can be distinguished. At the end of the third joint of the peduncle, he says, there is observable an inconsiderable conical process set off from the joint, which seems to be the last remnant of the antennary scale. In discussing the second antennae of the Macrura, Spence Bate, in his Challenger report says, "One thing, however, is invariably constant, that however few the joints of the peduncle may appear, that which supports the scaphocerite is always the second." Judging from Sars' figure (Arch. Naturv., v. 9, t. 5, f. 6), I believe that the rule is not really violated in the young *Upogebia*, and that the process is not on the third joint, but on the second, just as it is shown in Heller's figure of the adult *Upogebia littoralis*, and as it appears in *Upogebia capensis*. Heller says that the peduncle of the second antennae in this genus is composed of five joints, and gives a figure indicating their arrangement. But there is this to notice, that on the outer side the third joint is either not visible or is completely coalesced with the fourth, although on the inner side it forms a triangular lamina in alto-relief and densely fringed with setae, which serve as a sort of brow to the adjacent eye.

In regard to the branchiae, various statements have been made which are not all easy to reconcile with one another and with the facts of the case. H. Milne-Edwards says the branchiae are "en brosse," in two rows, and that there is one above the second maxilliped (pate being no doubt a misprint for pate-mâchoire), and two above the third maxillipeds and four anterior trunk legs, thus reckoning eleven pairs in all. But de Haan and Huxley both state that the pairs of branchiae are ten in number. Moreover Huxley, after explaining that the branchies en brosse of Milne-Edwards may be called trichobranchiae, expressly declares that in *Gebia* and *Callianassa* the gills are phyllobranchiae (Proc. Zool. Soc. London for 1878, pp. 776, 782). Yet the narrow filaments of these gills, in four rows, two rows on each side of the midrib, would better justify the epithet trichobranchiate than those which are found in the Paraguridae, a family distinguished solely by its trichobranchiate gills. As to the pair of branchiae on the second maxillipeds, I am disposed to think that Milne-Edwards was right, though I cannot speak positively on the point, but I can say for certain that, at least in *Upogebia capensis*, there is a single pair of branchiae pertaining to the fifth pair of trunk-legs, and as they stand apart from and rather further from the centre than the other branchiae, they are easily distinguished.

A singular character of this genus, mentioned by de Haan and by Boas, but by most authors neglected, is that in the male the first pleon segment is without pleopods, whereas it has them in the female, but of a form totally unlike the four following pairs, which are biramous, with the rami very unequal, but both broad and blade-like. The first pair, on the contrary, are uniramous, with a peduncle scarcely free from the segment carrying it, and a cylindrical or almost linear two-jointed ramus, such an appendage as might be expected rather on the male than the female.

A revision of the genus, based on adequate material, may eventually show that seeming discrepancies between various descriptions are due to real differences in the species examined.

UPOGEBIA CAPENSIS (Krauss).

1843. *Gebia major*, var. *capensis*, Krauss, Südafrik Crust., p. 54.

1892. *Gebia capensis*, Ortmann, Zoologische Jahrbücher, v. 6, p. 54.

1893. *Gebia capensis*, Ortmann, Decap. u. Schizop. Plankton-Exp., p. 49.

When Krauss wrote, de Haan's remarks on the genus *Gebia* and his figures of *Gebia major* from Japan had been published, but the description of the species did not appear till 1849, at p. 165 of the Fauna Japonica, Crustacea, decas sexta. Krauss was therefore unable to determine whether the form found at the Cape was specifically identical with the Japanese form or distinct from it. By way of compromise he named it as a variety. He was struck by the considerable difference of size suggested by the name of de Haan's species, a difference to which some importance may be allowed when it does not stand alone. *Upogebia major* attains a length of more than three inches and a half, while *Upogebia capensis* does not attain to two and a half. Dr. Ortmann decides that the two species are distinct, but without giving the marks of differentiation. To judge by de Haan's figure the chelipeds in his species have the fifth joint (or wrist) much more strongly dentate on the upper margin than it is in the Cape species, which has a single apical tooth emerging from this hair-clothed border. In the second pair of legs de Haan's species has a strongly denticulate border to the fourth joint, which in the Cape species appears to be free from denticles, though carrying the usual immensely long setae. In the fifth pair of legs the fourth, fifth and sixth joints are in both species approximately equal. The telson

is somewhat differently shaped in the two forms, having in de Haan's figure straight sides, whereas in *Upogebia capensis* the telson is broader in the upper half than in the lower, the diminution in width taking place rather abruptly near the middle. Krauss states that the colour of the Cape species when alive is bluish green, after drying turning reddish-yellow. He found it common in Table Bay, and Dr. Gilchrist informs me that it is very abundant in some of the "Vleis" or salt water lakes of the colony, the specimens sent being from Zwartkops River, Algoa Bay. Stimpson's *Gebia subspinasa* from Simon's Bay has the legs of the first three pairs armed near the base with a sharp spine, which is wanting in the species described by Krauss.

Fam.: Crangonidae.

1837. *Crangoniens* (tribe), Milne-Edwards, Hist. Nat. Crust., vol. 2, p. 339.
1852. *Crangoninae* (sub-fam.), Dana, Proc. Ac. Nat. Sci. Philad., Jan., 1852, p. 15.
1852. *Crangoninae*, Dana, U.S. Expl. Exp., vol. 13, Crust., pt. 1., p. 532.
1853. *Crangonidae*, Bell, Brit. Stalk-eyed Crust., p. 255.
1862. *Crangonidae*, Kinahan, Proc. Royal Irish Acad., vol. 8, part 1, p. 3 (extract).
1871. *Crangonidae*, Kinahan, Trans. Roy. Irish Acad., vol. 24, p. 57.
1885. *Crangonidae*, Sars, Norske Nordhavs Exp., Crust., vol. 1, p. 14.
1888. *Crangonidae*, Bate, Challenger Macrura, Reports, vol. 24, p. 481.
1890. *Crangonidae*, Ortmann, Zool. Jahrb., vol. 5, part 1, p. 530.
1890. *Crangonidae*, Sars, Decapodernes Forvandlinger, Arch. Naturv., p. 132.
1893. *Crangonidae*, Stebbing, Hist. Crust., Intern. Sci. Ser., vol. 74, p. 224.
1896. *Crangonidae*, Ortmann, Zool. Jabrb., vol. 9, p. 425.

Mandibles simple, without palp; second maxillae and first maxillipeds with the inner plates reduced. First trunk-legs strong, subchelate; second thin, chelate or simple, fifth joint (wrist) undivided, this pair often short and in one genus wholly wanting; third pair slender, simple; fourth and fifth pairs more robust, simple. Pleopods two-branched; tail-fan well developed.

Dr. Ortmann adds to the above characters that there are no epipods and exopods on the trunk-legs, and that the rostrum is generally short and flat. There is, however, a small exopod on the first trunk-legs in *Ægeon cataphractus* and some other species. In my History of Crustacea I have followed Spence Bate in saying that "the second maxillipeds end in a rudimentary sixth joint, and the third pair have neither the sixth nor the seventh joint." Spence Bate's own expressions are, "First pair of gnathopoda without a dactylos, and the propodos reduced to a rudimentary condition. Second pair having neither dactylos nor propodos." I am now far from thinking this a correct interpretation of the phenomena. In the second maxillipeds (first gnathopoda) the short strongly spined terminal joint no doubt represents the true seventh. It may be difficult to determine the boundaries of the basal joints, but the three terminal are marked off by the customary flexure. In like manner in the third maxillipeds it is clear that the geniculation occurs between the fourth and fifth joints, and in all probability the sixth joint which is much longer than the fifth represents a coalescence of the sixth and seventh joints. It must, however, be remarked that in *Sclerocrangon* Sars has discovered a minute terminal joint, as Kröyer had earlier done in his *Crangon nanus*, and it is therefore possible that in other genera this dwindled representative of the seventh joint may have vanished altogether, leaving the maxillipeds to end with the sixth. The geniculation referred to is, at any rate sometimes, very pronounced in *Ægeon*, and, independently of it, Bate's description of the third maxillipeds in his own genus *Pontocaris* agrees with the view here set forth and is inconsistent with his definition of the family.

It happens that Dr. Ortmann makes no mention of *Pontocaris*, and that Bate takes no notice of *Ægeon*. But specimens from the Cape so minutely agree with Heller's tolerably full description of *Ægeon cataphractus* (Olivi), and at the same time differ so little from Bate's two species of *Pontocaris*, that I feel no hesitation in making that genus a synonym of *Ægeon*.

The genus *Rhynchocinetes*, Milne-Edwards, included among the Crangonidae in my History of Crustacea, should be removed, since it has an articulated rostrum and a palp to the mandibles. Dr. Ortmaan has established a family Rhynchocinetidae. The genus *Nika*, Risso, included in the Crangonidae by Sars, should be called *Processa*, Leach, and referred to the family Processidae, Ortmann, 1896.

Cheraphilus, Kinahan, 1862, at its institution not only included the type species of *Pontophilus*, Leach, 1817, but was

expressly stated to be in substitution for that name, which Kinahan supposed to have lapsed. Since *Pontophilus* is now upheld it is evident that *Cheraphilus* itself must lapse, and the species which have been referred to it, *Crangon nanus*, Kröyer; *C. echinulatus*, M. Sars; and *C. neglectus*, G. O. Sars, may be placed under the new generic name *Philocheras*, which has the accent on the ante-penultimate syllable.

The name *Egeon*, Risso, 1816, was preoccupied, and perhaps for that reason it occurs in the altered form *Ægeon* in the writings of Guérin-Méneville, 1835; Kinahan, 1862; Ortmann, 1890. The two latter authors draw a very fine distinction between this genus and *Pontophilus*, namely, that the latter has the rostrum pointed or somewhat rounded, while in *Ægeon* it is broadly truncate or emarginate. This distinction is untenable if I am right in considering that *Pontocaris* is a synonym of *Ægeon*, for in Bate's genus the rostrum is emarginate in one species and pointed in the other. According to Bate the branchial formula of *Pontocaris* differs from that of *Pontophilus* by not including a rudimentary mastigobranchia on the third maxillipeds. He also points out the interesting distinction that in *Pontocaris* "the inferior extremity of each branchial plume is thrown forwards," which I have verified in the case of *Ægeon cataphractus*, whereas in *Crangon* and *Pontophilus* the extremity is directed backwards. Whether Bate's definition of *Pontophilus* is based on any examination of the type species is left uncertain in his "Challenger" report. He makes a reference, but a wrong one, to the work in which the genus was instituted. In his revision of "The Crustacea in Couch's Cornish Fauna," 1878, he speaks of having frequently taken the type species in question, and there calls it *Crangon spinosus*. Sars, in his Essay on the Metamorphoses of the Crangonidae, notes that *Pontophilus* has six pairs of well developed branchiae, and a rudimentary pair, as distinguished from *Crangon* and *Cheraphilus*, in which there are only five pairs of branchiae. He further shows that between the larval forms there are some very striking differences, the telson for instance in *Crangon* and *Cheraphilus* being broadly truncate, but in *Pontophilus* variously bifid.

Sars also shows that in the larval forms of the Crangonidae the mandibles have both molar and dentate cutting edge. According to Spence Bate and Ortmann it is the cutting edge that disappears in the adult and the molar that remains. But it seems more natural to suppose that the dentate apex of the adult mandible represents the cutting edge, and that the molar has disappeared, as in many other crustaceans it undoubtedly does.

In the present state of knowledge the following table may suffice to discriminate the genera of this family :—

1. Second pair of trunk-legs wanting. 1. *Paracrangon*, Dana, 1852.
Second pair of trunk-legs present, 2.

2. Second pair of trunk-legs simple. 2. *Sabinea*, Owen, 1835.
Second pair of trunk-legs chelate, 3.

3. Fourth and fifth pairs of trunk-legs, seventh joint laminar. 3. *Argis*, Kröyer, 1843.
Fourth and fifth pairs of trunk-legs, seventh joint not laminar, 4.

4. Second trunk-legs subequal in length to the rest, 5.
Second trunk-legs much shorter than the rest, 6.

5. Body dorsally little or not at all sculptured. 4. *Crangon*, Fabricius, 1798.
Body dorsally strongly sculptured. 5. *Sclerocrangon*, Sars, 1882.

6. With only five pairs of branchiae. 6. *Philócheras*, n.n.
With more than five pairs of branchiae, 7.

7. Apices of branchiae turned backward. 7. *Pontóphilus*, Leach, 1817.
Apices of branchiae turned forward. 8. *Ægeon*, Guérin-Méneville, 1835.

Gen. : Ægeon, Guérin-Méneville.

1816. *Egeon*, Risso, Hist. Nat. Crust. de Nice, p. 99.
1825. *Egeon* (part), Desmarest, Consid. gén. Crust., p. 218.
1826. *Egeon*, Risso, Hist. Nat. Europe mérid., vol. 5, p. 64.
1835. *Ægeon*, Guérin-Méneville, Exp. Sci. Morée.
1837. *Crangon* (part), Milne-Edwards, Hist. Nat. Crust., vol. 2, p. 340.
1862. *Ægeon*, Kinahan, Proc. Roy. Irish Acad., vol. 8, part 1, p. 9.
1863. *Crangon* (part), Heller, Crust. Südl. Europa, p. 224.
1881. *Crangon* (*Cheraphilus*), Miers, Ann. Nat. Hist., Ser. 5, vol. 8, p. 365.
1885. *Ægeon*, Carus, Prodr. Faunae Mediterraneae, vol. 1, p. 483.
1888. *Pontocaris*, Bate, Challenger Macrura, Reports, vol. 24, p. 495.
1890. *Ægeon*, Ortmann, Zool. Jahrb., vol. 5, part 1, p. 530.
1893. *Egeon*, Stebbing, Hist. Crust., Intern. Sci. Ser., vol. 74, p. 226.

How many species may properly be referred to this genus does not appear to have been yet determined by any full and accurate examination, nor have I the materials for deciding. In addition to the characters mentioned in the discussion of the family given above, Bate mentions that in his two species of *Pontocaris* the rostrum is short, not longer than the eye-stalks, that the exopod of the second antennae is short and broad, that the first trunk-legs have a small one-jointed exopod, that the pleopods are broad and foliaceous, and that the outer branch of the uropods has no diæresis. All these characters belong also to *Ægeon cataphractus*. In the latter, and apparently also in the other two species, the longer inner flagellum of the first antennae is except at the distal part greatly widened in the male, but not in the female.

ÆGEON CATAPHRACTUS (Olivi).

1792. *Cancer cataphractus*, Olivi, Zoologia adriatica, p. 50, pl. 3, f. 1.
1816. *Egeon loricatus*, Risso, Crust. de Nice, p. 100.
1826. *Egeon loricatus*, Risso, Hist. Nat. Europe Mérid., vol. 5, pl. 1, f. 3.
1837. *Crangon catapractus*, Milne-Edwards, Hist. Nat. Crust., vol. 2, p. 343.
1839. *Crangon catapractus*, Milne-Edwards, Règne Animal, Ed. illustr., pl. 51, f. 3.
1849. *Crangon catapractus*, Lucas, Expl. Sci. Algérie, Crust., p. 39.
1862. *Crangon cataphractus*, Heller, Crust. Südl. Europa, p. 230, pl. 7, f. 12-15.
1869. *Crangon cataphractus*, Nardo, Mem. R. Ist. Veneto, vol. 14, p. 237.
1881. *Crangon* (*Cheraphilus*) *cataphractus*, Miers, Ann. Nat. Hist., Ser. 5, vol. 8, p. 365.
1885. *Crangon cataphractus*, Carus, Prodr. Faunae Mediterraneae, p. 482.
1890. *Ægeon cataphractus*, Ortmann, Zool. Jahrb., vol. 5, part 1, p. 535.

This species is easily distinguished from the *Pontocaris propensalata* and *Pontocaris pennata* of Bate, because of the seven carinae on the carapace, the central one is formed of only four or five teeth, while in those species it is composed of nine teeth, of which the hinder ones are comparatively small. *Ægeon pennatus*, unlike the other two, has the fronto-lateral angles of the carapace strongly produced into oblique processes, and *Ægeon propensalatus* has an acute rostrum instead of the emarginate one found in *Ægeon cataphractus* and at least in one specimen of *Ægeon pennatus*.

Ægeon cataphractus is said to be common in the Mediterranean, at a distance from the shore, and in depths of 20-30 fathoms. Miers reports it "with scarcely any doubt," from Goree Island, Senegambia. Its range is now extended to the Cape. The specimens, two of which measured each an inch and three-tenths or about 33 mm, were taken "between Cove Rock and Hood Point near East London, 33° 5′ 45″ S., 27° 52′ 45″ E., by shrimp-trawl, at 40 fathoms depth, on bottom of sand, shells and mud."

ISOPODA.

Fam.: Idoteidae.

1829. *Idotéides* (part), Leach in Latreille, Règne Animal, Cuvier, v. 4, p. 138.
1840. *Idotéides* (part), Milne-Edwards, Hist. Nat. Crust., v. 3, p. 121.
1843. *Idoteidea*, Krauss, Südafrik. Crust., p. 61.
1852. *Idotaeidae*, Dana, Amer. Journ. Sci., Ser. 2, v. 14, p. 300.
1853. *Idotaeidae*, Dana, U. S. Expl. Exp., v. 13, Crust., pp. 697, 1436.
1867. *Idoteidae*, Bate and Westwood, Brit. Sess. Crust., v. 2, p. 375.
1876. *Idoteidae*, Miers, Catal. New Zealand Crust., p. 91.
1880. *Idoteidae*, Harger, U.S. Fish and Fisheries Report for 1878, pt. 6, p. 335.
1881. *Idoteidae*, Miers, J. Linn, Soc. London, v. 16, p. 4.
1893. *Idoteidae*, Stebbing, History of Crustacea, p. 372.
1894-5. *Idoteidae*, Dollfus, Feuille des Jeunes Naturalistes, Ser. 3, Année 25, No. 289, p. 1, No. 292, p. 1.
1897. *Idotheidae*, Sars, Crustacea of Norway, v. 2, p. 78.
1897. *Idotheidae*, Sars, Caspian Crustacea, Annuaire Mus. Zool. Ac. Impér. St. Pétersbourg, Extr. p. 21.
1899. *Idoteidae*, Harriet Richardson, Pr. U.S. Mus., v. 21, p. 842.

The typical genus was called *Idotea* by J. C. Fabricius when he instituted it in 1798 in his Supplementum, p 302. An index to the Supplementum, published in 1799, gives the name as *Idothea*. The older spelling is also the one that has been the more generally adopted.

Notwithstanding the strong resemblance outwardly among species of this family, authors have found it expedient to distribute them over several genera. As usually happens when superficial likeness is striking the separation of similar forms has not met with universal acceptance, and some of the genera have been discarded as needless. But renewed

investigation has brought several of them to life again, and in this process the pleon, which at first glance would not seem likely to offer differentiating characters of generic value, has been latterly made to play an important part.

Though the pleon throughout the family is dorsally very compact, and in some species has all its segments coalesced, there are many in which the segmentation is not entirely neglected. The dividing line may either be dorsally complete or limited to the sides, or dorsally expressed but laterally incomplete. In *Stenosoma*, Leach, and *Erichsonia*, Dana, there are no such dividing lines. In *Epelys*, Dana, and *Synidotea*, Harger, there are the lateral rudiments of one line. A new genus, *Paridotea*, has one line and lateral rudiments of two others. In *Idotea*, Fabricius, sensu strictiore, there are two lines and one pair of lateral rudiments. The same seems to be the case with *Cleantis*, Dana, according to his account of the type species, but in the figure three lines are shown in addition to the pair of rudiments. In *Edotia*, Guérin-Méneville, there are three lines. In *Zenobiana*, Stebbing (n.n., 1895, for *Zenobia*, Risso, 1826, pre-occupied), there are three lines and one pair of lateral rudiments. In *Chiridotea*, Harger, there are three lines, with (or without) one or two dorsal rudiments. In *Glyptonotus*, Eights, there are four lines.

It is at once obvious that the character in question is not sufficient by itself for the delimitation of the genera, and it is still uncertain whether it can conveniently be allowed anything more than specific value, when all members of the family are taken into consideration. In the genus *Cleantis*, for example, its use will be completely nullified, if we accept the extension given to that genus by Mr. E. J. Miers, who includes in his generic definition a pleon "with all the segments coalescent, or composed of two to five distinct segments." But so wide or loose a characteristic seems more proper to the definition of the family than of a single genus. Suitably used, the segmentation of the pleon may prove a very serviceable adjunct to other generic characters, among which may be mentioned the extent and number of the side-plates in the peraeon, the one-jointed or many-jointed flagellum of the second antennae, the number of distinct joints in the maxillipeds, and the presence or absence of the second branch of the opercular uropods.

Paridotea, n.g.

Side-plates of second and third peraeon segments not reaching to the end of the respective segments. Pleon with one short basal segment and lateral divisions indicating

second and third. Second antennae with many-jointed flagellum. Maxillipeds six-jointed, ultimate joint oval, very much smaller than the penultimate. Uropods without a second ramus.

PARIDOTEA UNGULATA (Pallas).

1772. *Oniscus ungulatus*, Pallas, Spicil. Zool., Fasc. 9, p. 62, t. 4, f. 11.
1818. *Idotea ungulata*, Lamarck, Hist. Anim. sans Vertèbres, v. 5, p. 160.
1836 ? *Idotea Edwardsii*, Guérin-Méneville, Iconographie, Crust., p. 33 (without figure).
1840. *Idotea Lalandii*, Milne-Edwards, Hist Nat. Crust., v. 3, p. 132, t. 31, f. 7.
1840. *Idotea affinis*, Milne-Edwards, Hist Nat. Crust., v. 3, p. 133.
1843. *Idotea Lalandii*, Krauss, Südafrik. Crust., p. 61.
1843. *Idotea affinis*, Krauss, Südafrik. Crust., p. 61.
1861. *Idotea nitida*, Heller, Verhandl Zool.-bot. Vereins Wien, p. 497.
1868. *Idotea nitida*, Heller, Reise der Novara, p. 131, t. 12, f. 1.
1868. *Idotea affinis*, Heller, Reise der Novara, p. 130.
1876. *Idotea affinis*, Miers, Catal. New Zealand Crust., p. 93.
1879. *Idotea affinis*, Thomson, Trans. New Zealand Inst., v. 11, p. 232.
1881. *Idotea ungulata*, Miers, J. Linn. Soc. London, v. 16, p. 52.

There is good reason to think that the above synonymy supplied by Miers in his careful discussion of this species is thoroughly trustworthy. Miers examined the types of *Idotea Lalandii* from the Cape in the Paris collection, so that Milne-Edwards evidently used a misleading expression in saying that the side-plates were of the same form as in *Idotea tricuspidata*, because in that species those of the second and third peraeon segments are as long as the segments. In describing the colour as blackish and figuring the animal as of a deep purplish black, Milne-Edwards may be supposed to have had in view an abnormally coloured specimen, since none of the other authors make mention of this funereal hue. Krauss gives the colour of *Idotea affinis* as yellowish green with blackish dots. Heller describes the same species as greyish green with the side-plates somewhat lighter, and for his *Idotea nitida* says that the colour of the body is grey, finely dotted with black, flecked with brownish red, the pleon somewhat darker; the legs, especially towards their end, with

a brownish red flush. The specimens in formalin sent me from the Cape correspond well with the colour description of *Idotea affinis* given by Krauss and Heller, the general effect being a dark appearance dorsally.

As the species has been carefully and accurately described by Mr. Miers, it is unnecessary to repeat what can be found in his important work on the Idoteidae. It may, however, be mentioned that the eyes are irregularly round and somewhat prominent, and that there is a rather conspicuous spine on the inner margin of the penultimate (sixth) joint of the peraeopods a little above the middle. In the large dredged specimens the fourth, fifth, and sixth joints of both gnathopods and first four peraeopods are thickly coated with hair on the inner margin, while in the longer fifth peraeopods the fifth and sixth joints are almost smooth, but in the smaller beach specimens sent me all the peraeopods have the joints in question comparatively smooth, and thus show the marginal spine of the sixth joint much more distinctly than is the case in the larger specimens.

No description appears to have been given of the mouth-organs of this species, but Milne-Edwards has supplied a figure of one of the mandibles and of the maxillipeds. The epistome, or that part of it distinguished by Dollfus as the mesepistome, has the usual conical prominence above or forward, and is produced below or backward so as to flank on either side the transversely oval labrum or upper lip. The two lobes of the lower lip are roughly rotundo-quadrate, converging below. The left mandible has a straight trunk, the cutting plate horny in appearance, divided into three or four broad teeth, the secondary plate having three strong teeth, the spine-row about five slender serrate spines ; the molar is strong and prominent, with an accessory brush of setae ; above the molar there is a process, near the point at which the palp might be expected, were it present. The right mandible has the trunk geniculate, the teeth of the cutting-plate more tooth-like, the secondary plate with about four slender teeth ; there is also a marginal tuft of hairs to the rear of the molar, but these may be present though not observed, also on the other mandible. The first maxillae have six strongly plumose setae on the narrow inner plate and ten stout apical spines on the outer. The three plates of the second maxillae are approximately equal in breadth. In the maxillipeds the epipod is slightly narrowed distally, with a rounded apex turned in upon the first joint of the palp ; the narrowly oblong plate which surmounts the long second joint of the stem has on and near the apex several spines and plumose spiniform setae, and also on the inner margin near

the base three spines standing out at right angles to the margin, the lowest one straight, the other two rather larger and apically knobbed or hooked; of the four-jointed palp the first joint is very short, the second not very long but distally very wide, overlapping the base of the next joint on the outer side with a narrow point, on the inner with a broad fringed lobe; the third joint is the longest, fringed on the inner margin, widening almost abruptly from the base, its distal margin truncate, much wider than the rounded oval, small, partially fringed, fourth joint.

Of the specimens sent me from the Cape two were dredged in Table Bay, and measured respectively 48 and 51 mm., two from Woodstock Beach, Table Bay, measured 39 and 40 mm. The range of the species includes the Indian Ocean, New Zealand, South Australia, Auckland, Chili, Rio Janeiro, as well as the Cape of Good Hope.

Fam.: Cymothoidae.

1867. *Cymothoidae*, Bate and Westwood, British Sessile-eyed Crustacea, v. 2, p. 274.
1880. *Cymothoidae*, Harger, U.S. Fish and Fisheries Report, Pt. 6 for 1878, p. 390.
1890. *Cymothoidae*, Hansen, "Cirolanidae," Vidensk. Selsk., Ser. 6, Naturv. Afd., v. 3, pp. 316, 406.
1893. *Cymothoidae*, Stebbing, History of Crustacea, p. 340.
1897. *Cymothoidae*, Sars, Crustacea of Norway, v. 2, p. 67.
1899. *Cymothoidae*, H. Richardson, Pr. U.S. Mus., v. 21, p. 828.

The genus *Cymothoa*, established by Fabricius in 1793, covered a very miscellaneous group of forms. In 1818 Leach (Dict. Sci. Nat., v. 12, p. 339) instituted the family Cymothoadae (see also Desmarest. Consid. gén Crustacés, p. 292, 1825). From this in 1840 Milne-Edwards (Hist. Nat. Crust., v. 3, p. 226) removed the Sphaeromidae and *Limnoria*, and established the Famille des Cymothoadiens, including three tribes, of which the first contained only the genus *Serolis*, the other two, the errant and the parasitic, corresponding respectively to the Ægidae and the Cymothoidae of Bate and Westwood. Carus in 1885 (Prodromus Faunae Mediterraneae, v. 1, p. 436) retains the family Cymothoidae of Milne-Edwards, as Krauss had done in 1843, Krauss, however, calling it Cymothoidea. Dana in 1853, under a sub-tribe Cymothoidea, includes three families, Cymothoidae, Ægidae, Spheromidae. In their Monograph of the Cymothoae, 1879-1884, Schiödte and Meinert recognize four

families, Ægidae, Anilocridae, Saophridae and Cymothoidae, excluding from the group the genera which were subsequently included by Hansen in the families Cirolanidae, Corallanidae, Alcironidae and Barybrotidae. Hansen in 1890 makes the Cymothoid group consist of six families, the four just mentioned and the Ægidae and Cymothoidae, but it must be observed that the Cymothoidae of Hansen includes the Anilocridae and Saophridae as well as the Cymothoidae of Schiödte and Meinert. Thus it will be seen that the family Cymothoidae, with some variations in the spelling of the name, has also had a diversified career, being sometimes restricted and sometimes extended, so that nothing like general agreement has yet been reached as to its limits. Hansen distinguishes it from the Ægidae by the mandibles being without accessory plate and with the first joint of the palp inflated, and by the maxillipeds being always four-jointed, with the last joint rather long and narrow and sub-acute, and adds that the adolescent or adult animals of this family may be further distinguished from the Ægidae by the following characters :—both pairs of antennae having the peduncle in general scarcely or not defined from the flagellum ; all the pleopods with bare rami ; terminal segment with bare margin ; uropods with margin of the rami bare at least in the female ; the animals hermaphrodite.

Gen : Anilocra, Leach.

1818. *Anilocra*, Leach, Dict. Sci. Nat., v. 12, p. 350.
1818. *Canolira*, Leach, Dict. Sci. Nat., v. 12, p. 350.
1825. *Anilocra*, Desmarest, Consid. gén. Crust., p. 306.
1829. *Canolira*, Latreille, Règne Animal, Cuvier, v. 4, p. 134.
1840. *Anilocra*, Milne-Edwards, Hist. Nat. Crust., v. 3, p. 255.
1853. *Anilocra*, Dana, U.S. Expl. Exp., Crust., v. 13, p. 747.
1870. *Epichthys*, Herklots, Arch. Néerland., v. 5, p. 122.
1881. *Anilocra*, Schiödte and Meinert, Mon. Cymothoarum, Naturh. Tidsskr., ser. 3, v. 13, p. 100.
1893. *Anilocra*, Stebbing, History of Crustacea, p. 352.

From the other genera assigned by Schiödte and Meinert to their family Anilocridae, this genus is distinguished by the rounded or sub-truncate cuneiform front of the head, while the Anilocridae in general are distinguished from the Saophridae and Cymothoidae of the same authors by having the peduncle of the uropods produced into a long inner spine.

ANILOCRA CAPENSIS, Leach.

1818. *Anilocra capensis*, Leach, Dict. Sci. Nat., v. 12, p. 350.
1825. *Anilocra capensis*, Desmarest, Consid. gén. Crust., p. 306, t. 48, f. 1.
1829. *Canolira du Cap*, Latreille, Règne Animal, Cuvier, v. 4, p. 134.
1836? *Canolira capensis*, Guérin-Méneville, Iconographie, Crust., t. 29, f. 5.
1840. *Anilocra capensis*, Milne-Edwards, Hist. Nat. Crust., v. 3, p. 258.
1843. *Anilocra capensis*, Krauss, Südafrik. Crust., p. 66.
1881. *Anilocra capensis*, Schiödte and Meinert, Mon. Cymoth., Naturh. Tidsskr., Ser 3, v. 13, pp. 103, 146, t. 10 (17), f. 4.

From the other species of the genus this is distinguished by the following combination of characters, that the first antennae are straight, not geniculate, the first free joint of the limbs is not carinate; the inner branch of the uropods is much shorter than the outer; and the front of the head is strongly produced and roundly truncate. Of these four characters the first three are common to *A. physodes*, *A. frontalis*, and *A. plebeia*, and of these *A. frontalis* has the same frontal character in the adult male but not in the ovigerous female, and *A. physodes* has the front in the ovigerous female rounded truncate but not strongly produced. The latter species and *A. capensis* attain a very much greater size than the other two, In *A. capensis* the eyes are sub-oval, while in *A. physodes* they are described as sub-pentagonal.

According to Leach's original description, the terminal segment abruptly narrows beyond its middle, and is feebly rounded and almost carinate. Schiödte and Meinert speak of the body as being slightly twisted to the right or the left. The specimen sent me is symmetrical, and has the terminal segment feebly carinate, apically well rounded, with no abrupt narrowing. The length is 53 m.m. Leach describes the colour as brown with an inclination to olive-green or grey, and testaceous or whitish hind margins to the segments.

Habitat. Simon's Bay, Cape of Good Hope. Specimens are recorded from Java and Teneriffe.

GEN.: MEINERTIA, Stebbing.

1883. *Ceratothoa* (not Dana, 1853), Schiödte and Meinert, Mon. Cymothoarum, Naturhistorisk Tidsskrift, Ser. 3, v. 13, pp. 289, 322.
1893. *Meinertia*, Stebbing, History of Crustacea, p. 354.

Schiödte and Meinert distinguished a new genus *Glossobius* in 1883 from another new genus *Emetha* and Dana's *Ceratothoa* by the character that in *Glossobius* the fingers are unequal, those of the third pair being the largest, whereas in the other genera the fingers are equal or sub-equal. But in this arrangement the only two species which Dana had assigned to his *Ceratothoa* were transferred to *Glossobius*, so that obviously *Glossobius* is a synonym of *Ceratothoa*, Dana, and the eleven species assigned by Schiödte and Meinert to their *Ceratothoa*, together with *Ceratothoa deplanata*, Bovallius, 1885, will be properly grouped under the generic name *Meinertia*. The *Ceratothoa lineata* of Miers, 1876, does not appear to be noticed in the Danish Monograph. It was founded on "a single specimen, probably young," which in the opinion of the author himself "ought perhaps to be referred to the genus *Cymothoa*" For the present, therefore, it may be left out of account.

MEINERTIA IMBRICATA (J. C. Fabricius).

1787. *Oniscus imbricatus*, Fabricius, Mantissa Insectorum, v. 1, p. 241.
1793. *Cymothoa imbricata*, Fabricius, Entom. Syst., v. 2, p. 503.
1798. *Cymothoa imbricata*, Fabricius, Supplementum, p. 304.
1818. *Cymothoa Banksii*, Leach, Dict. Sci. Nat., v. 12, p 353.
1835. *Cymothoa trigonocephala*, Milne-Edwards, Ann. Sci. Nat., Ser. 2, v. 3, t. 14, f. 1, 2.
1836 ? *Cymothoa trigonocephala*, Guérin-Méneville, Iconographie, Crust., t. 29, f. 2.
1839 ? *Cymothoa trigonocephala*, Milne-Edwards, Règne Animal, Ed. illust., Crust., t. 65, f. 2.
1840. *Cymothoa Banksii*, Milne-Edwards, Hist. Nat. Crust., v. 3, p. 273.
1876. *Ceratothoa Banksii*, Miers, Catal. Crust., New Zealand, p. 105.
1883. *Ceratothoa Banksii*, Schiödte and Meinert, Mon. Cymoth., Naturh. Tidsskr., Ser. 3, v. 13, p. 340, t. 14 (21), f. 6-21.
1884. *Ceratothoa imbricata*, Miers, Zool. Coll. H. M. S. "Alert," p. 300.
1890. *Ceratothoa Banksii*, Hansen, Cirolanidae, p. 68 (304), t. 10, f. 4.
1893. *Meinertia imbricatus*, Stebbing, History of Crustacea, p. 354.

Schiödte and Meinert divide the genus into three groups, respectively with the peraeon carinate, flattened or convex. The last group is sub-divided into those with the front angles of the first segment carinate, and those with the angles not

carinate. Of the latter some have the front of the head acute or sub-acute, but two, *Gaudichaudii* and *imbricata* have the front obtuse. *M. Gaudichaudii* in the ovigerous female has the sides of the head broadly rounded, the eyes sub-rotund, the inner ramus of the uropods falcate. *M. imbricata* of that sex and condition has the sides of the head emarginate, the eyes rhomboidal, the inner ramus often a little flexuous. From *M. trigonocephala* (of Schiödte and Meinert), in which the front of the head is sub-acute, *M. imbricata* is further distinguished by having the front margin of the first peraeon segment nearly straight instead of conspicuously bisinuate. But Miers, who carefully investigated the synonymy, thinks it not improbable that the original *C. trigonocephala*, Leach, ought to be regarded as a synonym of *M. imbricata*, and definitely includes in the synonymy as well the species which Heller names *Ceratothoa Banksii* (Reise der Novara, Crust., p. 148) as that which on the same page Heller describes as *C. trigonocephala*.

The female attains a length of 57 mm.

The species is recorded from the Indian Ocean, Java, New Zealand, Australia and the Cape.

Specimens sent me from the Cape were "from mouth of fish, Kalk Bay," with the note that the species is "a crustacean common in the mouth and gill cavity of the fish here."

The discussion of the mouth-organs of this species in Hansen's "Cirolanidae" will be found especially valuable.

COPEPODA PARASITICA.

Gen.: Sphyrion, Cuvier.

1830. "*Les Sphyrions*," Cuvier, Le Règne Animal, v. 3, p. 257.

1829-43. *Sphyrion*, Guérin-Méneville, Iconographie du Règne Animal, Zoophytes, p. 11.

1840. *Sphyrion*, Milne-Edwards, Hist. Nat. des Crustacés, v. 3, p. 525.

1845. *Lestes*, Kröyer, Danmarks Fiske, v. 2, p. 517.

1861. *Sphyrion*, Steenstrup and Lütken, Kong. Danske Vid. Selsk. Skrifter, Ser. 5, v. 5. Snyltekrebs og Lernaeer, p. 347 (7), 432 (92).

1864. *Lesteira*, Kröyer, Naturhistorisk Tidsskrift, Ser. 3, v. 2, pt. 3, p. 402.

1868. *Lesteira*, Heller, Reise der Novara, Crust., p. 228.

1890. *Lesteira*, G. M. Thomson, Trans. New Zealand Institute, v. 22, p. 370.

1899. *Sphyrion*, Bassett-Smith, Pr. Zool. Soc. London, pp. 441, 488.

In adult female cephalothorax transversely expanded, connected by a very narrow, smooth, cylindrical "neck" with a large and smooth, somewhat bulb-like genital segment, which carries behind two large clusters of tubules and two long and narrow ovisacs; the mouth very small, and apart from its obscure constituents no appendages present on the head or trunk. Male unknown. Young with eight pairs of appendages.

The generic name is obviously derived from σφυρίον, a little hammer. Cuvier, founding the genus upon the "*Chondracanthe lisse*" of Quoy and Gaimard, defines Sphyrion as having "la tête élargie des deux côtés, comme un marteau, de petits crochets à la bouche, un cou mince, suivi d'un corps déprimé et en forme de coeur, qui, outre les deux longs cordons, porte de chaque côté un gros faisceau de poils." There is little fault to be found with this definition, except that the word "poils" is inappropriate to the blunt-ended, often bifid and trifid, branchlets, which in two great bunches are appended to the genital segment, probably with a branchial function.

SPHYRION LAEVIGATUM, Guérin-Méneville.

PLATE 4.

1824. *Chondracanthe lisse*, Quoy et Gaimard, in Freycinet's Voyage autour du Monde, Zoologie, Atlas, pl. 86, fig. 10.

1830. *Sphyrion lisse*, Cuvier, Le Règne Animal, Zoophytes (Intestinaux cavitaires), vol. 3, p. 257.

1829-43. *Sphyrion laevigatus*, Guérin-Méneville, Iconographie du Règne Animal, Zoophytes, p. 11, pl. 9, fig. 4.

1840. *Sphyrion laevigatus*, Milne-Edwards, Hist. nat. des Crustacés, vol. 3, p. 526.

1836-49. "*Sphyrion levigatus*, Cuv." Le Règne Animal, Edit. illustrée, Zoophytes (Intestinaux, Cavitaires), p. 62, 63, pl. 32, fig. 4, 4a.

1869. *Sphyrion laevis*, Steenstrup, Oversigt Vidensk. selsk. Kjöbenhavn, p. 202, pl. 2, fig. 4a, 4b.

1890. *Lesteira kroyeri*, G. M. Thomson, Trans. New Zealand Institute, vol. 22, p. 370, pl. 28, f. 4, 4a.

1899. *Sphyrion laevigatum*, Bassett-Smith, Pr. Zool. Soc. London, p. 489.

The soft cephalothorax which is wholly embedded in the tissues of the host is in this species distinguished by its great width, being not as in *Sphyrion lumpi* (Kröyer) narrower, but much wider than the genital segment. It is also very nodulose and somewhat variably so, the extremities in Thomson's New Zealand specimen being simply rounded,

but in that of the Cape forming three nodules. On the front margin of the upper side are two very prominent bosses, one of which in the Cape specimen has a subsidiary nodule at its base. On the hind margin of this same side are two much smaller bosses, much closer together. Between the front points there is a shallow quadrilobate process, and just below this projects the minute mouth, consisting presumably of upper and lower lips and rudimentary mandibles. Of anything like antennae I see no trace either in Thomson's figure or in the Cape specimen.

From the middle of the under side of the great cephalothoracic expansion starts the smooth narrow chitinous "neck," which has a smaller relative length than in *Sphyrion lumpi*, but which cannot perhaps be depended upon as affording a specific character by its dimensions, there being in my opinion reason to suppose that it varies with the age and size of the specimen, becoming relatively smaller as the specimen grows larger.

In Quoy and Gaimard's figure this section of the animal is very elongate, but very short in the figure given by Guérin-Méneville.

The genital segment, which also has a firm smooth integument, is broader than long, and longer that thick. The upper and lateral margins are curved, the hinder is almost straight, with a slight median projection, explained as the rudimentary tail part. On either side of the latter are bunches of vesicles, which in the Cape specimen together exceed the size of the genital segment itself. The ovisacs are long and narrow, containing several rows of minute eggs.

The Cape specimen is rather less than two inches long, 47 mm., the head 30 mm. wide. Thomson's New Zealand specimen "taken from the abdomen of a ling *(Genypterus blacodes)*" was about 70 mm. long, with the head 59 mm. wide. In both specimens the neck measured 12 mm. Kröyer's *Sphyrion lumpi* was found burrowing in the tail fin of a *Cyclopterus lumpus* from Iceland. It was two inches long. The difference in the proportional sizes of its parts, the much less nodulose head, the very "elongate neck," and the northern habitat, make it at least possible that it may be a distinct species.

In 1871 (Tr. Linn. Soc. London, v. 27, p. 501, t. 59, fig. 12), a third species was described by Dr. R. O. Cunningham, M.D., F.L.S., under the name *Sphyrion Kingi*. The specimens were taken from the gills of fish, on the East Coast of Patagonia. The head is very distinctly nodulose and the "neck" extremely short. But it is still an open question whether either this or Kröyer's species should be upheld as specifically distinct from *laevigatum*.

It may be noted that Quoy and Gaimard and Cuvier only give the specific name "*lisse*" in French, Guérin-Méneville being the first to give the the Latin *laevigatus*, so that to him the name of the species must be attributed. Milne-Edwards in 1840 refers to the part of the "Iconographie" here in question, thus showing that that work antedates his own.

CIRRIPEDIA.

FAM.: BALANIDAE.

GEN.: TUBICINELLA, Lamarck.

1802. *Tubicinella*, Lamarck, Annales du Museum, vol. 1.
1824. *Coronula*, de Blainville, Dict. Sciences Nat., vol. 32.
1854. *Tubicinella*, Darwin, Monograph of the Cirripedia (Ray Soc.), vol. 2, p. 430.

"Compartments six, of equal size; shell sub-cylindrical, wider at the top than at the basis, belted by several large transverse ridges" (Darwin).

TUBICINELLA TRACHEALIS (Shaw).

1802. *Tubicinella major et minor*, Lamarck, Ann. Mus., vol. 1, pl. 30, f. 1-2.
1806 ? *Lepas trachealis*, Shaw, Nat. Miscell. (1789-1813), vol. 17, pl. 726.
1815. *Lepas tracheaeformis*, Wood, General Conchology, pl. 4, f. 1-3.
1818. *Tubicinella balaenarum*, Lamarck, Anim. sans Vertèbres.
1824. *Tubicinella Lamarckii*, Leach, Encycl. Brit., Suppl., v. 3, pl 57.
1824. *Coronula tubicinella*, de Blainville, Dict. Sciences Nat., vol. 32, pl. 117, f. 5.
1825. *Tubicinella trachealis*, Gray, Annals of Philosophy, vol. 10.
1836 ? *Tubicinella balaenarum*, Guérin-Méneville, Iconographie du Règne Animal, Mollusques, p. 58, pl. 38, f. 14.
1854. *Tubicinella trachealis*, Darwin, Mon. Cirripedia, vol. 2, p. 431, pl. 17, f. 3*a-c*.
1873. *Tubicinella trachealis*, Steenstrup (in Lütken), Vidensk. Selsk. Skr., Ser. 5, Naturv. Afd., vol. 10, No. 3, p. 244 (16).

Darwin, from whose work I have taken most of the synonymy, rightly observes that Lamarck's alternative name for a single species cannot be retained, and that Shaw's *trachealis*, being next in priority, ought to be adopted.

The skin of the whale with a large group of these cirripedes burrowing into it to the depth of an inch and three-quarters presents an extraordinary spectacle. In some cases the

cavities seem to be enlarged at the top by the efforts of a crowd of *Cyamus pacificus* which are seen to be nestling round the cirripedes. According to Darwin's explanation the burrowing is rather apparent than real, the pressure of the group of cirripedes merely pressing inwards the skin of the whale, and the epidermis as it forms being pushed upwards between the nearly approximate shells. The young *Tubicinella*, though nearly cylindrical like the adult, has a very much smaller aperture, and, as the growth takes place at the base of the shell, the problem was how to account for the widening of the aperture at the top. The solution is that the upper margin suffers a gradual disintegration. For this the structure of the shell is adapted, and specimens which by reason of their broken edges might be thought to be damaged and imperfect, are really in a condition essential to the growth of the animal. Darwin says that probably "the rapid downward growth of the shell, besides indenting the whale's skin, at the same time slowly pushes the whole shell out of the skin, and thus continually exposes the summit to the wear and breakage which seems to be necessary for its existence." It seems strange that the same rapidity of downward growth should have the two opposite effects of pushing the shell in and pushing it out. One would think it sufficient that the growth of the cirripede shell should keep pace with the formation of the upward pushing epidermis of the whale. Darwin thinks that the slightly greater width of the *Tubicinella* shell above than below is, on his view, beautifully explained, namely, "for the sake of facilitating the protrusion of the shell; for the ordinary conical shape of sessile cirripedes, with the apex upwards, would have rendered the pushing out of an imbedded shell almost impossible; on the other hand, we can see that the likewise very peculiar, concentric, prominent belts may be necessary to prevent too easy protrusion." But it is difficult to see why a slightly conical shell would have found any special difficulty in pushing out of the thinly surrounding walls of the whale's epidermis. At worst the shape could only have served the retarding purpose which Darwin attributes to the concentric belts. When a *Tubicinella* is taken out of the whale's skin, these belts are found to have left a pretty sharp impression, as sometimes the surface markings of a fossil are imprinted on the matrix. The epidermis pushing between the nearly contiguous shells will naturally take the impress of their projections, but the shells pushing through the epidermis would obliterate the stamp.

The specimens sent me were from a Right Whale taken in False Bay.

EXPLANATION OF PLATES.

PLATE 1.

PALINURUS GILCHRISTI, n. sp.

Dorsal view of a specimen, natural size, with detached flagellum of second antenna at the side.

PLATE 2.

CALLIANASSA KRAUSSI, n. sp.

n.s. Dorsal view of a specimen, natural size. The parts are figured from a rather smaller specimen; all to the same degree of magnification, except the still more enlarged border of the mandible and setae of the pleopod.

a.s. First antenna. a.i. Second antenna, showing only the first few joints of the flagellum. With these are shown the eyes and frontal margin.

mdb. Mandible.

mx. 2. Second maxilla.

mxp. 3. Third or outer maxilliped, with a portion of a branchia attached.

plp. 4. Extremity of outer ramus of fourth pleopod.

urp. The uropod on one side of the caudal fan.

T. The telson.

PLATE 3.

prp. 1-5. The trunk-limbs, without the branchiæ, much less highly magnified than the figures on the preceding plate, except the separate terminal portions of prp. 3-5. The lower prp. 1. is the left cheliped, the upper is the large right cheliped. The apex of prp. 5 is more enlarged than the other figures.

PLATE 4.

SPHYRION LAEVIGATUM, Guérin-Méneville.

INDEX.

Page.
Acanthonyx - - - - 18
Acanthopus (Dehaanius) - 19
Ægeon - - - - - 47
Affinis (*Idotea*) - - - 53
Americanus (Astacus) - 34
Anilocra - - - - - 56
Anomala (Brachyura) - 22
Argis - - - - - 49
Astacus - - - - - 33
Balaenarum (Tubicinella) - 62
Balanidae - - - 62
Banksii (*Ceratothoa*) - - 58
Banksii (*Cymothoa*) - - 58
Brachyura - - - 15
Calappidae - - - 21
Callianassa - - - 38
Callianassidae - - - 38
Canolira - - - - - 56
Capensis (Anilocra) - - 57
Capensis (Astacus) - - 34
Capensis (*Canolira*) - - 57
Capensis (*Gebia*) - - 45
Capensis (*Homarus*) - - 34
Capensis (Upogebia) - 45
Cataphractus (Ægeon) - 50
Cataphractus (*Cancer*) - 50
Cataphractus (*Cheraphilus*) 50
Cataphractus (*Crangon*) - 50
Cataphractus (*Egeon*) - 50
Ceratothoa - - - 57
Cheraphilus - - - 47
Chondracanthe - - - 60
Cirripedia - - - 62
Copepoda - - - 59
Coronula - - - - 62
Corystes - - - - 16
Corystidae - - - 16
Crangon - - - - 49
Crangonidae - - - 46
Cristiata (Mursia) - - 22
Cristimanus (Mursia) - 22
Cryptosoma - - - 22
Cyclometopa - - - 15
Cymothoidae - - - 55
Dehaanius - - - 18
Dentatus (*Acanthonyx*) - 19
Dentatus (Dehaanius) - 19
Dicera - - - - 16
Dimorphus *Eupagurus* - 28
Dimorphus (Parapagurus) - 26
Dromiidae - - - 23
Edwardsii (*Idotea*) - - 53
Egeon - - - - 49
Elephas (Palinurus) - - 30
Epichthys - - - - 56
Gammarus (Astacus) - 34
Gebia - - - - 42
Gebiopsis - - - 42
Gebios - - - - 42
Gilchristi (Palinurus) Plate 1 31
Homarus - - - - 33
Homarus (*Astacus*) - - 30
Idotea - - - - 51
Idoteidae - - - - 51
Idotheidae - - - 51
Imbricata (*Ceratothoa*) - 58
Imbricata (*Cymothoa*) - 58
Imbricata (Meinertia) - 59
Imbricatus (Meinertia) - 58
Imbricatus (*Oniscus*) - 58
Isopoda - - - - 51
Jasus - - - - 30
Kingi (Sphyrion) - - 61
Kraussi (Callianassa) Plates 2, 3 - - - - 39
Kroyeri (*Lesteira*) - - 60
Laevigatum (Sphyrion) Plate 4 60
Laevigatus (Sphyrion) - 60
Lalandii (*Idotea*) - - 53
Lalandii (Jasus) - - 30
Lamarckii (Tubicinella) - 62
Latens (Pseudodromia) - 24
Lesteira - - - - 59
Lestes - - - - 59
Levigatus (Sphyrion) - 60
Linuparis - - - 30
Longimanus (Palinurus) - 31
Loricatus (*Egeon*) - - 50
Lumpi (Sphyrion) - - 61

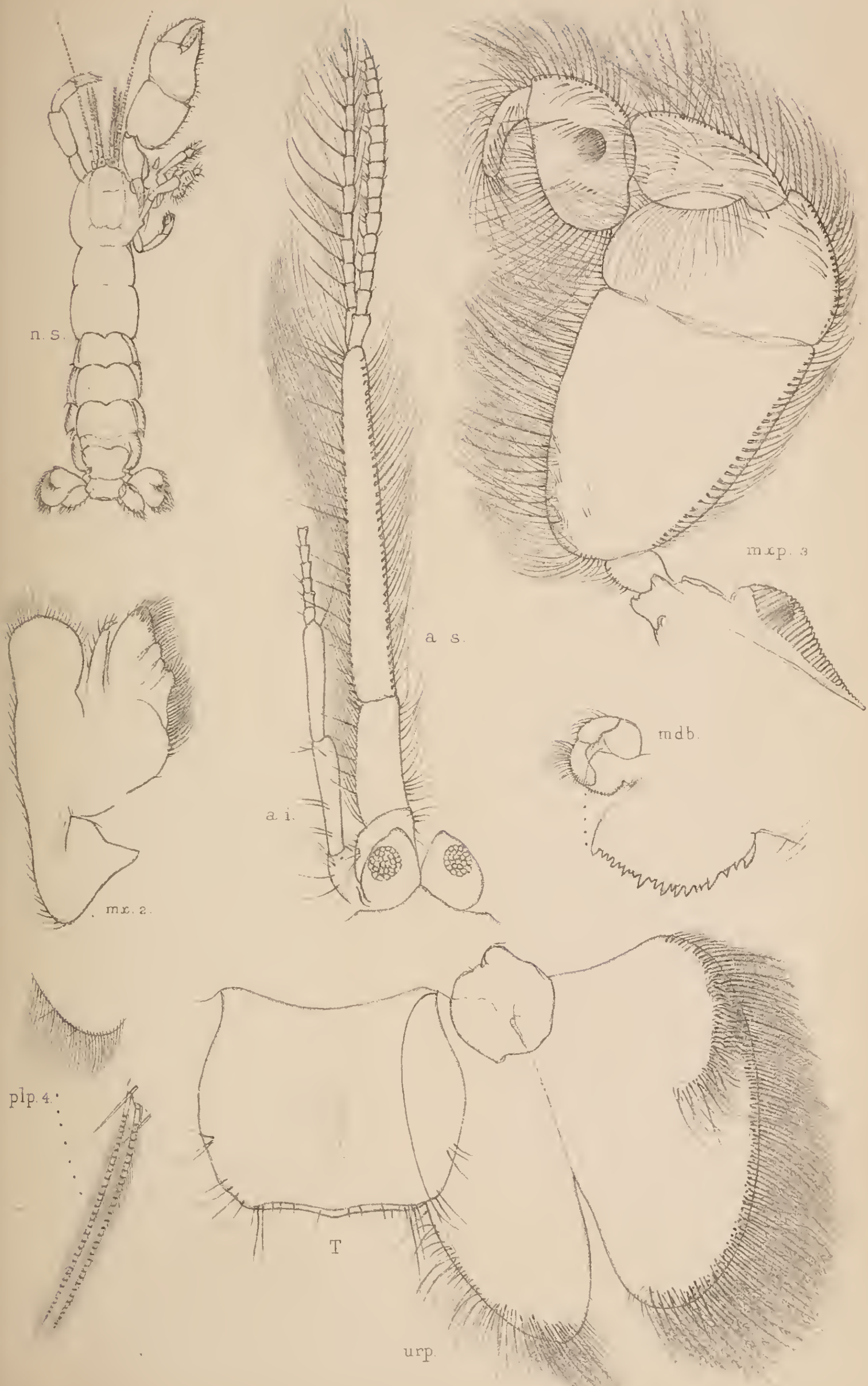
Macleayii (Acanthonyx ?) - 20
Macrura - - - 26
Maiidae - - - - 18
Major (*Gebia*, var. capensis) 45
Mauritianus (Palinurus longimanus var.) - 31
Meinertia - - - 57
Menippidae - - - 15
Mursia - - - - 21
Nautilocorystes - - 16
Nephrops - - - 33
Nephropsidae - - - 33
Nitida (*Idotea*) - - - 53
Novae-britanniae (Calianassa) 39
Ocellatus (Nautilocorystes) 17
Octodentata (*Dicera*) - 17
Octodentatus (Nautilocorystes) - - - 17
Orientis (*Cryptosoma*) - 22
Oxyrrhyncha - - - 18
Oxystomata - - - 21
Palinuridae - - - 29
Palinurus - - - 29
Panulirus - - - 31
Paracrangon - - - 49
Parapaguridae - - - 26
Parapagurus - - - 27
Paridotea - - - 52
Pennatus (Ægeon) - - 50
Philocheras - - - 48
Pilosimanus (Parapagurus) 29
Pilumninae - - - 15
Pilumnus - - - 15
Pontocaris - - - 49
Pontophilus - - - 47
Potamobiidae - - - 34
Propensalatus (Ægeon) - 50
Pseudodromia - - - 23
Pugettia - - - - 19
Quadridentatus (Acanthonyx ?) - - - 20
Sabinea - - - - 49
Sclerocrangon - - - 49
Silentes - - - - 30
Sphyrion - - - - 59
Stridentes - - - 30
Thealia - - - - 21
Tracheaeformis (*Lepas*) - 62
Trachealis (*Lepas*) - - 62
Trachealis (Tubicinella) - 62
Trigonocephala (*Cymothoa*) - 58
Trigonus (Linuparis) - 30
Truncata (Callianassa) - 39
Tubicinella - - - 62
Tubicinella (*Coronula*) - 62
Ungulata (*Idotea*) - - 53
Ungulata (Paridotea) - 53
Ungulatus (*Oniscus*) - - 53
Upogebia - - - 42
Verrucosipes (Pilumnus) - 15
Vulgaris (Palinurus) - - 31
Xanthidae - - - 15
Xanthini - - - 15

[*Published* 20*th July*, 1900.]

A. Rich del. ad nat.

West, Newman chrom.

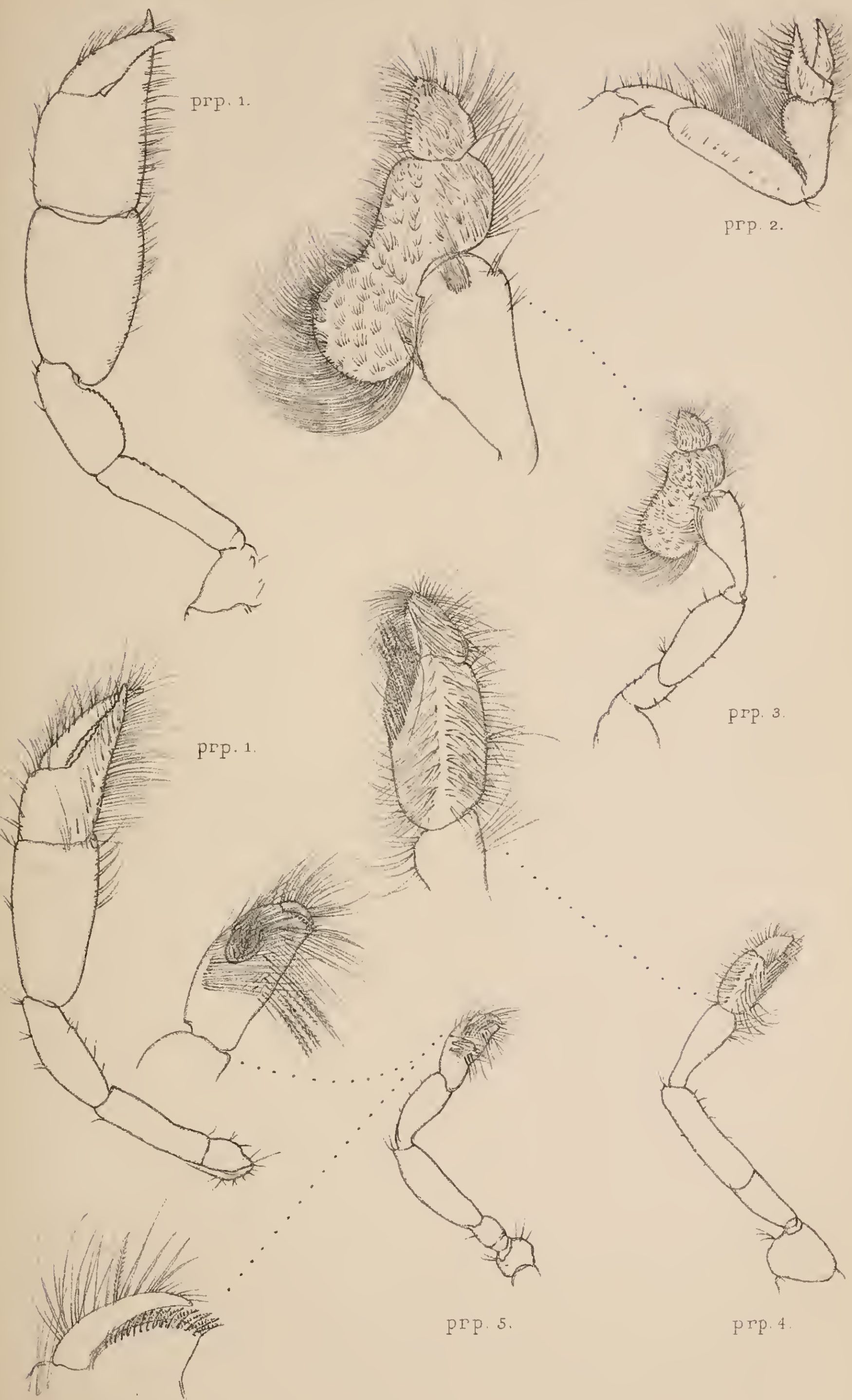
PALINURUS GILCHRISTI, *n. sp.*



Del. T.R.R. Stebbing.

J.T. Rennie Reid Lith Edin.

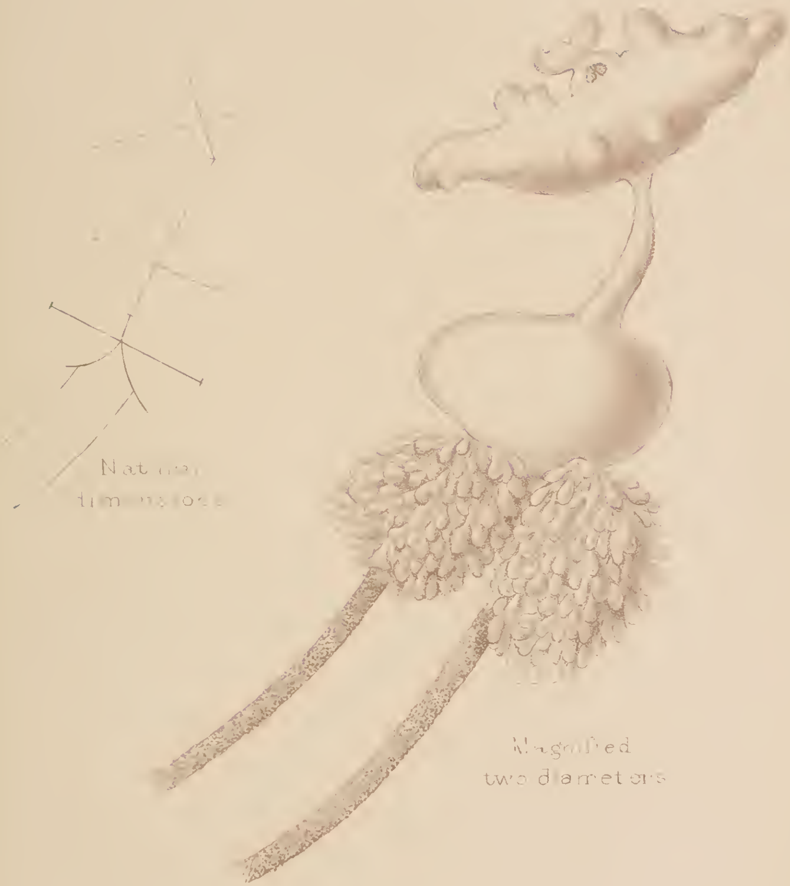
CALLIANASSA KRAUSSI, n sp



Del. T. R. R. Stebbing.

J. T. Rennie Reid, Lith. Edin.

CALLIANASSA KRAUSSI, n. sp.



T. R. R. del. West, Newman imp.

SPHYRION LAEVIGATUM, (Quoy & Gaimard.)

THE ALCYONARIA & HYDROCORALLINAE OF THE CAPE OF GOOD HOPE.

BY

SYDNEY J. HICKSON, M.A., D.Sc., F.R.S.,

BEYER PROFESSOR OF ZOOLOGY IN OWEN'S COLLEGE, MANCHESTER.

—:o:—

INTRODUCTION.

The specimens of Alcyonaria described in these pages were sent to me in four parcels during the years 1898 and 1899.

They were all killed when caught and very carefully preserved so that the details of their anatomical structure, both general and minute, could be studied with satisfactory results.

Freshly killed Alcyonarians, however, present this difficulty to the systematist that they are so different in general aspect from the dried specimens upon which the species have, in most cases, been founded that their identification, even when the types can be compared with them, is often unsatisfactory. I have done the best I could not to add new names to our literature unnecessarily, and have allowed a wide margin for possible local variation of widely distributed species. Four species, however, present features which separate them so markedly from anything hitherto described, that it is necessary to regard them as new to science, and for one of these the new genus Acrophytum is proposed.

The new species are Heteroxenia capensis, Sarcophytum trochiforme, Acrophytum claviger, and Gorgonia capensis.

It is perhaps premature to make any general statement concerning the Cape Alcyonarian fauna as a whole, as it is probable that several species new to the district have still to be brought to light, but so far as the collection goes it may be regarded as fairly characteristic of a temperate region bordering on the tropics. The tropical Indian Ocean forms are represented by such genera as Heteroxenia, Sarcophytum and Cavernularia, while the species Alcyonium antarcticum and possibly the species of Gorgonia have a wider distribution in the Southern Sea. Tropical Alcyonarians are frequently characterised by large spicules, abundance of spicules, or by massive skeletal structures, as exemplified by such genera as Alcyonium (tropical species), Spongodes, Tubipora, Heliopora, etc., but the Cape Alcyonarians are, if we may judge from this collection, more fleshy and soft, as the genera or species of the temperate regions usually are.

The excellent state of preservation of the specimens in this collection has afforded me plenty of material for the study of certain anatomical features which are not usually taken into consideration in systematic work, and I have devoted a considerable amount of time to the structure of the stomodaeum, mesenterial filaments, canal systems, and the mesogloeal structures of some of the species, in order to determine with greater certainty the value of the specific characters hitherto used by systematists. As my investigations on these points are not yet completed, however, I have decided to publish the systematic part of my work with only occasional references to them ; but I hope before long to have ready for publication a more extensive treatise on Alcyonarian structure, based in large measure on the Cape specimens. I take the opportunity to make this statement because I am anxious that the naturalists at the Cape who have taken so much care and exhibited so much skill in sending the material to England well preserved, should not feel that my interest in it ceases when I have labelled the specimens with names. There is one feature, however, due to the specimens being well preserved in spirit that I have incorporated in this paper, as I think it is worthy of consideration in connection with fishery matters. The Alcyonaria, like other Anthozoa, are apparently distasteful to fish. I believe there is no record of any fish that feeds on Alcyonaria, except Pennatulids, either regularly or spasmodically, and in my experience they never show any signs of having been nibbled or bitten by any animal provided with teeth. But with this statement the interest in them from the fishery

standpoint should not cease. Every year the female colony shoots out into the water a large number of eggs which, being provided with a considerable quantity of yolk and having no spicules nor offensive weapons in the form of thread cells, may form a substantial meal to certain species of fish. This is, of course, simply a suggestion, as there is no evidence that fish do feed upon these ova, but I venture to think it is a suggestion worthy of some experimental inquiry. For this reason I have added a statement concerning the condition of the sexual organs of each species. The isolated observations I have been able to make do not give satisfactory results, but they seem to point to the existence of two spawning seasons among the Alcyonarians. Heteroxenia and Gorgonia capensis probably spawn in June or July, while Alcyonium pachyclados, Cavernularia (both species), Juncella, and Acrophytum spawn in December, January, or February.

There are not many references in literature to Alcyonaria from the Cape of Good Hope. Ellis and Solander described Gorgonia flammea in 1786. Möbius, in 1861, described Solanderia verrucosa from Algoa Bay, the name being afterwards changed by Kölliker to Spongioderma verrucosum, and from the same locality a new species of Lophogorgia, namely, L. crista. In 1878, Studer described Isidella (Primnoisis) capensis, Eunicella papillosa, Anthelia capensis, Leptogorgia palma (Gorgonia flammea) and Eunicella albicans.

Verrill (18) enumerated the following species of Alcyonaria from the Cape of Good Hope.

Euplexaura capensis, Leptogorgia flammea, Eunicella palma, Eunephthya thyrsoidea. It is impossible to determine what the Euplexaura is that he refers to here, as he gives no figure. The description of the spicules does not correspond with any of the spicules from the present collection. Leptogorgia flammea (Verrill) is the same as the Gorgonia flammea of our collections, Eunicella palma = Gorgonia albicans of Kölliker is included in Studer's genus Platygorgia. I cannot, however, identify any of my specimens with this species. The Eunephthya was obtained in False Bay at a depth of 20 fathoms. Verrill gives a figure which, although not very satisfactory, is sufficient to indicate that the species is not in our collection. The colour is described as wine yellow or light brown.

As it may be of some service to those who have opportunities of examining Alcyonarians from localities in the

neighbourhood of the Cape, I append a table showing the names and distribution of the species sent to me :—

Names.	Locality.	Depth.
Heteroxenia capensis n. sp.	False Bay	20 fms.
Alcyonium pachyclados Klunz.	off Cape St. Blaize and off Algoa Bay	15-18 fms. 25 fms.
Alcyonium antarcticum W. & S.	17 miles E. of E. London	45 fms.
Acryphytum claviger n.g. et sp.	Algoa Bay	26 fms.
Sarcophytum trochiforme n sp.	17 miles E. of E. London	45 fms.
Melitodes dichotoma. Pall.	False Bay	31 fms.
Spongioderma verrucosum Mob.	off Algoa Bay	25 fms.
Gorgonia flammea. E. & S.	all along the coast in shallow water.	
Gorgonia capensis, n. sp.	10 miles off C. St. Blaize	40 fms.
Juncella elongata. Pall.	off Algoa Bay	25 fms.
Eunicella papillosa. Esp.	off Algoa Bay	25 fms.
Primnoisis capensis. Studer	off Algoa Bay	25 fms.
Villogorgia mauritiensis. Ridley	off East London	85 fms.
Virgularia Reinwardti. Herk.	St. Francis Bay	30 fms.
Cavernularia elegans. Herk.	False Bay	25 fms.
Cavernularia obesa. Val.	near Port Alfred	40-43 fms.

SUB-ORDER ALCYONACEA.

FAM. XENIIDAE.

HETEROXENIA CAPENSIS, n. sp.—PLATE IV., FIG. C.

Two specimens, supposed at first to belong to Studer's species, Anthelia capensis, were procured in False Bay on the 24th of March, 1898, at a depth of 20 fathoms. One of these specimens was sent to me, and at the first glance I thought the identification was justified. As soon as I cut out a small segment of the colony it was clear that the specimen was either a Xenia or closely allied to it. The deceptive appear-

ance of the specimen is due to the fact that the stalk is completely covered by a milky white encrusting mass of the compound Ascidian Leptoclinum speciosum (Herdman), which so completely hides it that the Alcyonarian polyps appear to spring from flat plate-like stolon encrusting a solid white substance. An examination of sections of the colony prove it to be a new species of the genus Heteroxenia Köll.

The colony is 45 mm. high by 37 mm. in diameter at the crown, cylindroidal in form, the stem covered with an encrusting growth of the Tunicate Leptoclinum. The Autozooids protrude about 6 mm. from the coenenchym, but are in some cases retracted. The tentacles of the autozoids, from 4-6 mm. in length, usually provided with one row of 8-10 pinnules on each side. The siphonozoids numerous and not prominent. Spicules very scarce ; absent in the polyps ; rarely more than 0.01 mm. in greatest diameter. The colour in spirit is brown.

Locality : False Bay, Cape of Good Hope. 20 fathoms

Only one other species of this genus is known, namely, Heteroxenia Elizabethae Köll, which occurs at Port Denison (Kölliker) and Zanzibar (Bourne). Fortunately, in the writings of Kölliker, Bourne, and Ashworth we have an excellent description of the anatomy of this species. It differs from our new species in the following characters :— The exsert portions of the autozoids are much longer, namely, 10-28 mm. in length, and their tentacles have three rows of pinnules on each side. The siphonozoids protrude about 2 mm. from the surface of the coenenchym, and are provided with rudimentary tentacles. The spicules are numerous in the autozooids.

In some respects Heteroxenia capensis resembles H. rigida May (11) from Mozambique, in which the polyps protrude not more than 10 mm. from the coenenchym, and the tentacles possess one row of pinnules on each side. The specimen examined by May, however, was not very well preserved, and no evidence of dimorphism was discovered.

The number of rows of pinnules on the tentacles of the polyps of the Xeniidae is the character which is undoubtedly of some value in the determination of species but it presents some difficulties. In some of the autozooids of Heteroxenia capensis which were fully expanded there appeared to be clearly one row of pinnules only on each side of the tentacles ; but in others the pinnules were in two rows or irregularly distributed on the margins. I am inclined to think that the latter effect is partly if not wholly due to retraction.

There can be little doubt that the Cape species differs from other Xeniidae in its greater degree of retractility, some of the autozoids in the specimen being completely retracted. Before this can be accepted as a character of systematic importance we must await observations of the living animals.

The specimen was male but the sexual cells were not ripe on March 24th.

FAM.: ALCYONIDAE.

Alcyonium pachyclados. Kl.

Three specimens, one white, one yellow, and one red, must all be referred to this species.

The red specimen was found attached to a large piece of coarse sandstone 6¼ miles S.W. by W.¼W. of Cape St. Blaize. Depth: 15-18 fathoms. Bottom: stones.

Four specimens were taken in this haul, one of which was sent to me.

The white specimen was got off Algoa Bay close to Rij Bank, long. 25° 51′ 30″ E., lat. 33° 58′ S. Depth: 25 fathoms. Bottom: dark sand with black specks. Only two specimens were obtained. The yellow specimen was obtained in the same haul as the white specimen and was the only one obtained.

The measurements of the three colonies are as follows :—

	Height of Colony.	Length of stalk.	Branches.
White specimen ..	50 mm.	18 mm.	10 mm.
Red specimen ..	22 mm.	8 mm.	7 mm.
Yellow specimen ..	55 mm.	23 mm.	22 mm.

The spicules of the coenenchym are double clubs with short or very short connecting bars, about .05 mm. long by .03 mm. broad.

The type specimen of this species is 8-10 cm. long by 2-10 cm. in height, and the colour clear greyish white. The spicules of the type specimen are 0.08 — 0.096 mm. long by 0.48 broad. In the absence of any knowledge of the anatomy of this species, the identification of the Cape specimen with Alcyonium pachyclados may appear doubtful.

The differences in the measurements given above between the type and the Cape specimens do not, in my opinion, justify the separation of the latter into a new species.

Of the three specimens sent to me the yellow and the white specimens resemble each other more closely than either resembles the red specimen. But the latter is smaller and in other respects more dwarfed in growth than the other two, the branches being shorter and finer.

In order to satisfy myself that it really belonged to the same species I compared a series of longitudinal sections through a branch of this series with a corresponding series taken from the other two. I then discovered that the red specimen is a female, the yellow specimen a male and the white one apparently in a neutral condition. Apart from this point, which may be one of sexual difference, three specimens are identical in all essential anatomical details

Alcyonium antarcticum. W. & S. Plate IV. A.

Two specimens from lat. 32° 53′ S., long. 28° 12′ E., about 17 miles E. of East London, were procured by the dredge, December 23rd, 1898, depth 45 fathoms. Bottom : sand and mud (by lead), coralline material (by dredge).

Each specimen consists of a globular head 9-10 mm. in diameter situated on a short stalk (barren stem) rising from a thin membraneous stolon of considerable extent spreading over a compound annelid skeleton.*

In the larger specimens the polyps are only partially retracted, and the globular head and polyps are fairly translucent. The tentacles and the wall of the stomodaeum are all crowded with pink spicules. The coenenchym is white, but here and there a faint pinkish tint may be seen, due to scattered pink spicules occurring in it. The stalk is brownish in colour, hard and leathery in texture and covered with wrinkles. It is difficult to say how far this is due to post-mortem contractions.

The smaller specimen is faintly yellow in colour. The stolon is missing.

---

* Having but a small amount of this material, which consists of very hard conglomerated sand, I have not been able to identify it at present, but it appears to be formed by an annelid.

The spicules (of the larger specimen) are of two kinds :—1st, long narrow warted spindles (Plate IV., Fig. A′), 0.3 m. by .025 mm., pinkish in colour, occurring in the tentacles and stomodaeum ; 2nd, irregular spicules occurring in the superficial parts of the coenenchym. These are principally long double clubs (Plate IV., Fig. A′), and their average size is about .07 mm. by .06 mm. In the deeper parts of the coenenchym the spicules are similar in many respects to the spicules of the tentacles, but many of them are so much longer that they assume the shape which should be called technically that of needles. I have measured some of these that were over 0.5 mm. in length.

One specimen was searched for the sexual organs but was found to bear none.

The type specimen of Alcyonium antarcticum was obtained by the *Challenger* in 75 fathoms off Heard Island. It was considerably larger than either of the two specimens from the Cape, being 130 mm. in greatest diameter, and rising to a height of 55 mm. A quite similar form, but probably a young colony was found by Studer at the Cascade Ridge in N.E. Kerguelen, on the skin of a Macrocystis ; its colour in life was noted as " pale red." Unfortunately the specimen was lost.

Acrophytum claviger.

Nov. gen. et spec. Plate IV. B.B′.

Two specimens out of three obtained in Algoa Bay at a depth of 26 fathoms were sent to me. They must be placed in a new genus, for which I propose the name Acrophytum *.

Three genera belonging to the family Alcyonidae have been described as being dimorphic Sarcophytum (Lesson), Lobophytum (v. Marzeller), and Anthomastus (Verrill).

The genus Anthomastus should not, in my opinion, be recognised, as there is not sufficient ground for separating the species on which it was founded from Sarcophytum. The

---

* I am aware that the name Acrophytum has been previously used in Botany, but the species have been merged in the genus Cordiceps and the name does not appear in the Index Kewensis.

differences between the genera Sarcophytum and Lobophytum, as described by Von Marenzeller (10) do not appear to be of very great importance, but for reasons which will be set out in a later publication, I am inclined to retain both generic names.

The specimens from the Cape differ in form from both these genera, and associated with this there is a marked dfffer-ence in the character and distribution of the spicules, as well as important differences in anatomical details. Under these circumstances the formation of a new genus is imperative.

The brief description of the genus is as follows :—

Genus acrophytum. Plate IV., Figs. B.B′.

Colony unbranched, of the form of an elongated cone. Stalk not more than one-fourth part of the total length of the colony. Polyps dimorphic. Siphonozooids relatively fewer than in the genera Sarcophytum and Lobophytum. Spicules of the coenenchym numerous in the superficial ectoderm, rare or absent in the deeper parts of the colony. Ova very large.

One species is known, Acrophytum claviger discovered 6th December, 1898, Algoa Bay, lat. 33° 53′ 15″, long. 25° 51′ 43″ E. Depth: 26 fathoms. Bottom: sand.

Description of the specimens :—

	Specimen A.	B.
Total length of the Colony ..	125 mm.	70 mm.
Length of stalk	30 mm.	22 mm.
Diameter of the stalk ..	26 mm.	16 mm.
Diameter of rachis at its widest part	30 mm.	21 mm.

In both specimens the autozooids project from the coenenchym about 4 mm. and the diameter of the spread of the tentacles is about 3 mm. The pinnules are very numerous, completely covering the oral face of the tentacles. The siphonozooids may be seen scattered between the autozooids as minute rounded prominences perforated at the apex by a mouth. The surface of the coenenchym is very rough, being

in strong contrast with the surface of those species of Sarcophytum and Lobophytum I have examined, in which it is relatively smooth. It is very difficult in this genus to determine accurately the number of autozooids and siphonozooids in a given area as it is impossible to distinguish except in series of sections the young retracted autozooids from siphonozooids. The relative number of the two forms seems to vary in diffierent parts of the colony, the siphonozooids being apparently more numerous near the apex than in the neighbourhood of the stalk. At a distance of 30 mm. from the apex I counted in an area of 1 sq. cm. 12 autozooids, and 36 siphonozooids, and in another $\frac{2}{3}$ sq. cm., 90 mm. from the apex, I counted only 5 autozooids and 13 siphonozooids. The arrangement of the polyps is, however, very irregular, the number in any given area depending very largely upon the condition in which the part was when the colony was killed. The only point as regards the arrangement of the polyp that can be used for systematic purposes is that the siphonozooids are relatively fewer than in the genera Sarcophytum and Lobophytum. We have not yet any very satisfactory statements of the average number of siphonozooids in these genera. In my sections, however, I find in a species of Lobophytum collected by Dr. Willey more than 40 siphonozooids to each autozooid ; and, judging from the descriptions of Moseley, as well as from my own sections of the genus Sarcophytum, there must be in some parts of the colony at least as many as 25 siphonozooids to each autozooid. In Acrophytum there are rarely more than 4 or 5 siphonozooids to each autozooid.

The spicules of Acrophytum are found in a dense row in the superficial ectoderm of the coenenchym. They are very characteristically club-shaped (see Plate IV., B′), 0.25 mm. long by 0.1 mm. broad. Below the surface the coenenchym is almost entirely free from spicules, a very striking feature of the genus (or species ?) when it is compared with the two other dimorphic genera previously mentioned. There are no spicules in the exsert portion of the polyps.

Sex : The larger of the two forms is a female, the large brown eggs occurring in small numbers in the autozooid polyp tubes. They vary very considerably in size, the largest being oval in shape and nearly 2 mm. in greatest diameter. Judging from the character of the germinal vesicle, I am of opinion that the larger eggs are ready to be spawned , or, in other words, the specimen was sexually mature. The eggs of this species are the largest I have observed in any Alcyon-

arian. Moseley says, that in Sarcophytum the ova are 7 mm. in diameter, but having examined a few sections of the actual specimens described by him, I think this must be a misprint for 0.7 mm. In Alcyonium digitatum the ripe ova are only 0.5 mm. in diameter, and in nearly all Alcyonarians the ova are approximately the same size.

The smaller specimen is a male, the sperm sacs not being quite mature.

Sarcophytum trochiforme.

New Species. Plate III. C., VI. C.

Four of several specimens obtained when trawling in lat. 32° 53′ S., long. 28° 12′ E. (about 17 miles E. of East London), depth: 45 fathoms, bottom: sand and mud and corallines, were sent to me.

They are all top-shaped, the crown being rounded in outline and presenting no well-marked edge as in Sarcophytum. The stalk is, in the preserved specimens, variously wrinkled and varies considerably in the degree of attenuation it presents. The specimens are white, but there is a ring of bright red spicules round the base of the exsert portions of the polyps, and the spicules of the tentacles and the body wall of the exsert portions of the polyps are bright yellow.

Numerous siphonozooids are crowded between the autozooids, the mouth of each one opening in a small convex protuberance. Owing to this protuberance and their relatively large size the siphonozooids are much more conspicuous than those of other species of the genus.

The specimen (IV.) I dissected was 10 mm. in length, 6.5 mm. in diameter at the widest part of the crown, and 3.5 mm. at the narrowest part of the stalk. The corresponding measurements of the other three were : (I.) 38, 15, 5 ; (II.) 10, 6, 4 ; and (III.) 21, 4, 1.5. No. II. is characterised by having a short broad stalk, No. III. by having a very long and slender stalk.

The yellow spicules which occur in abundance in the tentacles are rods with rather swollen extremities covered with warts (Plate VI., C″) .05 mm. in length, by .015 mm. in breadth. The body walls of the autozooids are strengthened

by long warted spindle-shaped spicules of various sizes up to a maximum of about .15 mm. in length by .025 in breadth (Plate VI., C′). The red spicules at the base of the retractile portion of the autozooids are double clubs with a very short connecting bar .03 mm. in length, .02 mm. in breadth (C). The other spicules, which are densely packed in the superficial parts of the coenenchym, are of the same shape and size as these spicules.

This species differs from all the known species of Sarcophytum in several characters, of which the more important are :—The constriction of the base, the colour of the spicules, of the tentacles, and of the coenenchym round the autozooids, the small size of the spicules (*i.e.*, about one-tenth the length of the average of Sarcophytum spicules), and the relatively large size and prominence of the siphonozooids.

SUB-ORDER GORGONACEA.

One of the most difficult points in the morphology and classification of the Alcyonarian is the determination of a satisfactory boundary between the Alcyonacea and the Gorgonacea. The present system is certainly not satisfactory, but as an improved one must depend upon the results of a series of observations which are not yet completed I have decided to adhere to it in this paper.

I have very little doubt that the genera Gorgonia, Juncella, Eunicella, Villogorgia, and Primnoisis are rightly included in the sub-order Gorgonacea, but I have considerable hesitation in separating Spongioderma and Melitodes from genera which are usually included in the Alcyonacea.

FAM.: BRIAREIDAE.

Spongioderma verrucosum Möb.

Two specimens were sent to me obtained off Algoa Bay, close to Rij Bank, long. 25° 51′ 30″ E., lat 33° 58′ S. Depth: 25 fathoms. Bottom: dark sand with black specks.

This species was first described and figured in 1862 by Möbius under the name Solanderia verrucosa. His specimen was obtained in Algoa Bay. In 1866, Gray, who overlooked Möbius's paper, gave a short description of a specimen obtained near the Cape of Good Hope for the British Museum, under the name Homophyton gattyiae. Three or four years later Kölliker made a careful investigation of the specimens attributed to the genus Solanderia, and discovered that the specimen for which this name was first proposed was a sponge. He therefore proposed to abandon the name Solanderia from the group of Alcyonaria altogether, and in so doing changed the name of the Cape species to Spongioderma verrucosum.

One of the specimens sent to me is an unbranched fragment, about 200 mm. in length and 5 mm. in diameter. The coenenchym is bright red in colour, and the moderately prominent verrucae yellow. The greater part of the fragment is covered with a thin coating of a sponge belonging to the genus Esperella, only the yellow verrucae projecting through it. This sponge is described as being like " mucilage " when fresh. It is interesting to note that the specimen described by Möbius was also covered with this same sponge.

It is not necessary to give in this place in detail the general characters of the species ; but as a point of systematic interest, attention may be called to the very great variety of form and colour presented by its spicules.

Some of them are figured in the paper by Möbius, but no attempt is made to state in words the form of the spicules. Apart from the fact that they are all, or nearly all, profusely ornamented with blunt papilliform processes, they have no characteristic feature. There are spheres, rods, spindles, plates, tripods, crosses, etc., etc., varying in size from 0.2 mm. in greatest length to less than .03 mm. in diameter. In colour every variety of tint may be found of yellow, pink and red ; and many spicules appear when seen singly to be quite colourless.

I can find no evidence of sexual organs in this specimen.

Another fragment collected in the same haul is 220 mm. high, and consists of a piece of main branch (?) and three branchlets. It differs from the type specimen in having the verrucae of a red instead of a yellow colour, but the coenenchym is encrusted with the same species of sponge.

FAM.: MELITODIDAE.

Melitodes dichotoma, Pallas. Plates I., II., and VI., B.

Three specimens were sent to me, which I believe belong to the species called by Pallas Isis dichotoma, and amended by Wright and Studer to Melitodes dichotoma.

The following notes were attached :—

"No. 2.—Yellow Alcyonarian (original colour) well pre-"served, procured by large trawl in False Bay, lat. 34° "19′ 15″ S.; long. 18° 36′ 30″ E., over 8.35 p.m.—"9.40 p.m. About half-a-dozen pieces procured, 27th Sep-"tember, 1898. This is not nearly so abundant as No. 1 "(Gorgonia flammea), only one other specimen having been "got as yet, badly preserved.

"No. 3.—Red specimen, got at the same time and place "and in same abundance ; badly preserved.

"No. 5.—Specimen same as No. 2, but probably better "preserved."

It is interesting to note in this place that the red specimen No. 3 turns out to be the best preserved specimen of an Alcyonarian, that has been sent to me from abroad. It is true that the polyps are not fully expanded, but the details of the histology are almost perfect.

The very striking difference in colour between the yellow form Nos. 2 and 5 and the red form No. 3 suggest that we are dealing with two distinct species, but the study of the hard and soft parts shows that, except colour, there are no characters which separate the two forms (Plates I. and II.).

It is well known that in the Alcyonarians the colour of the spicules (and the colour of all preserved specimens is chiefly due to the colour of the spicules) is a very uncertain and variable character. Von Koch (3) gives a very beautiful example of this in Muricea chamaeleon, in which yellow and red varieties occur, and one specimen which he figures is partly yellow and partly red.

The fact that the yellow and red varieties of Melitodes dichotoma were taken in the trawl at the same time and place only confirms the opinion gained by the study of anatomy that they are not distinct species. It is quite probable that

when this ground is again dredged piebald varieties will also be found. I was particularly pleased to find among the Cape Alcyonaria these specimens of the genus Melitodes, because it is the only genus of Gorgonacea in which dimorphism of the polyps has been described (Ridley, 14). Ridley's specimens of Melitodes albitincta were not preserved in spirit, and I had some doubt at the time his paper was published whether the examination of dried specimens was sufficient to prove the existence of true dimorphism. In the yellow variety from the Cape it may be clearly demonstrated that the polyps on the terminal branches are not all of the same size, and a condition very similar to that figured by Ridley would doubtless be produced in dried and contracted specimens (Plate VI., B). An examination of sections, however, proves that the larger and smaller polyps do not differ in any essential respects. The small polyps possess eight tentacles and eight mesenteries similar to those of the larger ones of the colony, and there can be no doubt that they are simply undeveloped polyps of the ordinary kind.

It seems to me, then, that we are justified in saying that dimorphism has not yet been observed in the Gorgonacea.

Neither the yellow nor the red variety exhibit sexual cells very far advanced towards maturity ; but the presence of one or two young egg cells in the latter prove it to be a female. The sex of the former I have not at present been able to determine.

As these specimens were obtained in September it would be interesting to examine specimens found in March and April, when they would probably be approaching sexual maturity.

FAM.: GORGONIDAE.

Gorgonia flammea. Ellis and Solander.
Plate V., B.

The genus Lophogorgia was founded by Milne Edwards for Gorgonia palma (Esper), which was afterwards called Gorgonia flammea by Ellis and Solander. Neither Kölliker nor Verrill accepted the new generic name, the former including it in the genus Gorgonia and the latter in the genus Leptogorgia. Wright and Studer, however, have more

recently revived the genus Lophogorgia, but on what appear to me to be insufficient grounds. The only character which distinguishes it from other Gorgonidae is that the axis is somewhat flattened, *i.e.*, it is oval instead of round in section. This character, however, is a very variable one. The younger branches of a large specimen have the axis round in section, and it is as a rule only in the main stems that the flattening of the axis is seen in a marked degree. Moreover, a considerable flattening of the axis is often seen in other Gorgonias of a fan-shaped habit of growth.

There may be a difference of opinion about the desirability of dividing up the old genera and recognising a large number of generic names in place of them ; but, in my opinion, the flatness or roundness of the axis standing by itself is not a character which can be considered of more than specific value, and there may indeed be some doubt as to its value in distinguishing species.

I am inclined, then, to agree with Kölliker, who includes all species in which the horny axis is not strengthened by secretions of calcium carbonate in the genus Gorgonia. In adopting Kölliker's view as to the generic name, a difficulty arises regarding the specific name. There is no doubt that if we followed strictly the rules of precedence that Kölliker's plan would be adopted of calling it Gorgonia palma Esp., but, as pointed out by Wright and Studer, this leads to confusion with Gorgonia palma Pall., which is very different in many respects. The term "palma," moreover, does not convey an acurate idea of any characteristic feature of the species. Ellis and Solander's term "flammea" does call attention to the bright red colour which characterises most of the known specimens, and therefore I think it is best called Gorgonia flammea E. and S. The spicules of the coenenchym are of the shape known as double spindles. Their average length is about .07 mm. but they vary from 0.1 mm. —0.05 mm. in length.

Two specimens, obtained in the dredge between Seal Island and Mossel Bay, at a depth of 5 fathoms, were sent to me. Mr. Gilchrist informs me that "this Alcyonarian has been found in abundance in False Bay and Mossel Bay, and I think occurs all along the shore. I have seen a dried specimen about 4 feet high." These specimens were collected on the 29th of June.

Another specimen of the same species dredged on November 1st, close to the Rij Bank, Algoa Bay, at a depth of 25 fathoms, was sent to me later.

None of these specimens showed any sexual organs. These facts suggest that the spawning period of the species is probably in the spring or early summer.

Gorgonia capensis, n. sp.
Plate V. A.

A beautiful yellow Gorgonia, obtained in 40 fathoms 10 miles S.W.¼W. of Cape St. Blaize, differs in several essential respects from any species that has yet been described.

Description.—The specimen is 250 mm. in length, the base missing. The branches are not disposed in one plane. Terminal branches elongated. Main axis 2 mm. in diameter. Branches 1 mm. in diameter terminating bluntly. Axis and branches cylindrical in form. Surface smooth, the delicate transparent polyps projecting from narrow bi-convex slits without forming verrucae. The spicules of the coenenchym are warty spindles of the general form of those described by Kölliker as "doppelspindeln," on an average 0.1 mm. in length.

The polyps are scattered evenly over all sides of the branches. Over the older branches the coenenchym is thin, but the terminal branches are relatively fleshy.

There can be little doubt that this species is closely related to Gorgonia (Lophogorgia) Lütkeni Wright and Studer which was found in 310 fathoms off Prince Edward Island, 960 miles from the Cape.

It differs from Wright and Studer's species in the following particulars :—The axis is cylindrical and not appreciably flattened, the polyps are evenly scattered in the coenenchym, leaving no bare lines or patches, the spindles are decidedly smaller (the spicules of G. Lütkeni being 0.2 mm. and 0.3 mm. in length) *. In the shape of the spicules there is a very striking resemblance between these two species and Gorgonia flammea.

In many particulars in which this new species differs from G. Lütkeni and G. flammea it approaches those species of the genus which were formerly grouped under the generic name of Leptogorgia.

---

* Since writing this I have examined a piece of the type specimen of G. Lütkeni from the British Museum and find them the same size as in G. capensis but red in colour like flammea. Not one was as much as 0·2 mm. in length.

On making a series of sections through a branch in order to compare the general anatomy of this species with that of Gorgonia flammea, I was surprised to find numerous oval bodies, the largest of which were 1 by 0.8 mm. in size, situated in what appeared to be special sacs in the coenenchym. These bodies proved to be embryos, and each one lies in a special enlargement of one of the intermesenterial spaces of a polyp.

In most cases there is only one embryo to each polyp but not unfrequently there are two. There are very few barren polyps, except at the ends of the branches, and as some of the pregnant polyps are killed expanded and in all cases their tissues are in a healthy state, there is no reason to suppose that the digestive function is interfered with by the embryo. There is certainly no evidence of dimorphism such as occurs in Paragorgia, in which the siphonozoids produce the gonads and the autozooids are sterile.

It is interesting to speculate on the mode of discharge of these embryos. As the mouth of the polyp can not be more than 0.01 mm. in length, *i.e.*, one-hundreth part of the length of the embryo, it is improbable that they are discharged by the mouth after the manner of the ova of other Alcyonaria. I have observed that in the older branches of the specimen the crust of coenenchym covering the axis has a longitudinal split of considerable length, and that below this the coenenchym is thin and without embryos. It seems to me, then, to be possible that the coenenchym is actually ruptured from time to time to allow the escape of the embryos, and is afterwards regenerated.

The princpal interest of the specimen, however, is that it affords a rare instance of viviparity among the Alcyonarians. There is a figure in Kölliker's Icones XIV 3 of Gorgonia (Pterogorgia) pinnata, in which the polyp cavity is shown in section to be divided by a septum into two compartments, and this figure reminds me very forcibly of some of the sections in my series which were cut through the brood chamber without actualy touching the embryo. There is no mention in the text, however, of any embryos, and it is possible that this second chamber in Kölliker's figure has some other meaning *.

* Lacaze Duthiers (1) proved the precious coral to be viviparous, and according to Marion and Kowalewsky the "Clavulaires petricoles" are viviparous, but the "Clavulaires des Posidonies" are oviparous. Sympodium (Alcyonium) coralloides is also according to these authors viviparous. Koren and Daniellsen (8) state that three species of Nepthya found at depths of 269-761 fathoms are viviparous. These are, I believe, the only authenticated cases of viviparity among Alcyonarians hitherto recorded. Gorgonia capensis affords the first instance of viviparity that I have come across in my studies of Alcyonarians.

In adition to the embryos I have found in the polyp cavities a few ova. These are on an average 0.12 mm. in diameter. I cannot tell in what stage they are, but judging from the nucleus alone it. appears probable that they are nearly mature. On searching through a great many sections I can find no trace of any intermediate stages between these immature ova and the sterrula larvae.

As regards the anatomy of the polyps, all that can be said at present is that there is a very long stomodaeum, which bears on the ventral side a well marked siphonoglyph.

The specimen was dredged on June 8th, 1898,—that is, three weeks earlier than the specimens of Gorgonia flammea. The facts of the sexuality of the genus so far ascertained suggest one or two inquiries for those who have the opportunity of working in the same field. It would be interesting to know if the phenomenon of viviparity is peculiar to Gorgonia capensis which has hitherto been found only at a depth of 40 fathoms, and whether the time of sexual maturity of the two species is, as the facts suggest, the early weeks of June. It is also very desirable to determine the character and history of the eggs of Gorgonia flammea.

FAM.: GORGONELLIDAE.

Juncella elongata (Pallas). Plate V. D.

Owing to the very imperfect state of our knowledge of the Juncella group of Alcyonarians, I have considerable hesitation in naming the two specimens of the genus sent to me from the Cape. The specimens are 250 mm. and 300 mm. in length respectively, the larger branching dichotomously into seven branches, the longest unbranched free end being 150 mm. in length.

Both specimens are imperfect, the base being wanting. The thickest part of the stem is 7 mm. in diameter, and the branches terminate bluntly with an apical diameter of 3 mm.

In the parts of the branches with a diameter of 4 mm. the diameter of the axis is 2 mm.

The surface of the coenenchym is almost smooth, but in the smaller specimen there are slight verruciform projections. In the fragment of the stem of the larger specimen there are faint spiral lines.

One of the most characteristic features of the specimen is the great preponderance of triple-star spicules (Plate V. D) 0.07 mm. in length, but there are also many spicules of the shapes known as double stars, warted spindles, etc. There are very few spicules of the club-shape which are so characteristic of the species J. juncea and J. gemmacea (Kölliker).

The colour of the specimens is deep red.

They were dredged at Rij Bank on November 1st at a depth of 25 fathoms. For further particulars of this locality see Alcyonium pachyclados, p. 72.

The larger specimen is a female containing a few ova, which are oval in shape, with a maximum diameter of no less than 1 mm., *i.e.*, twice as large as the ova of Alcyonium digitatum. Judging from the condition of the nucleus I believe the ova are ready to be spawned

FAM.: PLEXAURIDAE.

Eunicella papillosa. (Esp.) Plate V. C.

A single complete specimen of this species was sent to me. It can be easily recognised by the very characteristic torch-like spicules .08 mm. in length (Plate V. C.) which crowd the superficial covering of the coenenchym. The coenenchym is partly covered by a thin layer of the same sponge which encrusts Spongioderma. I can find no sexual organs in the specimen which was dredged at Rij Bank in 25 fathoms of water. (See Alcyonium pachyclados, p. 72.)

FAM.: PRIMNOIDAE.

Primnoisis capensis (Studer). Plate VI. AA'.

This species was described by Studer under the name Isidella capensis, but was afterwards transferred to the genus Primnoisis (19). Studer's specimens were obtained in 50 fathoms, in lat. 33° 59′ S., and long. 17° 52′ E.

The single specimen sent to me from the Cape was obtained at Rij Bank (see Alcyonium pachyclados, p 72), 33° 58′ S., and 22° 51′ E., in 25 fathoms of water. It is 40 mm. high, branching dichotomously in one plane to form seven branchlets. The base is wanting. The thickness of the stem and branches is uniform and about 1 mm. in diameter. The colour is pale pink. The spicules are warty clubs and spindles about 0.2 mm. in length. There are no signs of any sexual organs.

FAM.: MURICEIDAE.

Villogorgia mauritiensis (Ridley).

This beautiful specimen was one of two obtained by the dredge off East London, January 28th, 1898, lat. 33° 6′ 30″ S., long. 28° 11′ E., at a depth of 85 fathoms.

The species was originally described by Ridley from a dried specimen obtained by Mr. de Robillard off Mauritius, from a depth of 80 fathoms. Allowing for the difference between well-preserved specimens in spirits and dried specimens, the resemblance of our specimen with the description of the type are sufficient to justify its inclusion in the species. The specimen is 200 mm. high, branching in one plane with an expanse of about 170 mm. The spicules are very irregular in size and shape. No sexual organs were discovered.

SUB-ORDER PENNATULACEA.

FAM.: VIRGULARIDAE.

Virgularia reinwardti. (Herklots.)

Two incomplete specimens of a species of Virgularia were sent to me which approach most closely to the description given of Virgularia reinwardti of Herklots by Kölliker, but in the absence of the basal part it is impossible to say for certain if they agree in all particulars with the type specimen.

Considerable interest attaches to these specimens, as the only Pennatulid which has hitherto been recorded from South African waters is the type specimen of Halisceptrum gustavianum var. parvifolia in the Stockholm Museum, which was found at Port Natal. The genus Halisceptrum approaches closely some of the species of Virgularia, and it may be a matter of some doubt whether these specimens are rightly referred to Virgularia or Halisceptrum.

For reasons which, in my opinion, are sufficient I propose to refer them to the species Virgularia reinwardti. The fragments are approximately of the same size, the larger being 126 mm. in length, 9 mm. in diameter at the widest part, with a bare ventral side 2 mm. in breadth. The length of Kölliker's specimen 3 was 178 mm., of which 43 was taken by the stalk, which is absent in our specimens, so that it is probable that in life they were of about the same length. The breadth of the plume at the widest part was in Kölliker's specimen No. 3, 3½ mm. There is so much difference in the thickness of Pennatulids, however, according to the method in which they have been killed and preserved, that I do not think this difference between our specimens and Kölliker's No. 3 should be regarded as one of very serious importance.

The arrangement of the siphonozooids in our specimens is the crucial point upon which my opinion is based that they should be referred to the species V. Reinwardti. Virgularia reinwardti is the only species in which the siphonozoids occur in a row on the leaves—one siphonozoid to each autozooid (7). The other species of the genus have a very different arrangement of the siphonozooids. There is one point of difference, however, between our specimens and the type. Kölliker describes and figures one isolated siphonozooid on the bare part of the axis at the margin of each leaf. "Zooide laterale je Eine Reihe zwischen zwei Blättern bildend von denen ventral je ein Zooid noch auf den Kiel ubergeht." This isolated zooid I cannot find in the Cape specimens.

Our specimens agree with the type in bearing 18 autozooids in each of the leaves I have examined.

They were obtained in the dredge on 3rd March, 1899, in St. Francis Bay, lat. 34° 2′ 20″ S., long. 25° 11′ 45″ E. Depth: 30 fathoms.

No sexual organs were observed in the specimen.

Cavernularia elegans (Herklots, sp.).

I have found considerable difficulty in the determination of this species. At first I thought it must be Veretillum Australasiae of Gray. The figure given by Gray, although very poor and drawn from a badly preserved specimen, showed some characters in common with the Cape specimen. It is, I believe, the only one of the club-shaped Pennatulids in which the rachis is figured and described as being so much as six times the length of the stalk. In some respects, too, it appears to be closely allied to Herklot's Sarcobelemnon elegans from Japan, the name of which was changed by Richiardi to Veretillum elegans, and by Kölliker to Cavernularia elegans, having apparently no axis and presenting on the surface quadrangular markings similar to those in Herklots' original figure.

The proportionate length of the rachis is, however, much less in Herklot's species than in our specimen A ; but I am not inclined to regard it as being distinct.

There can be no doubt that it belongs to Kölliker's family Veretilleae, the polyps being evenly distributed round the rachis and the " sarcosoma " abundant ; there can also be no doubt that it belongs to the same author's Cavernularidae as the spicules of the axis are long rods, and to his genus Cavernularia, as there are no spicules in the polyps, and no axis. Of the two species of Cavernularia mentioned by Kölliker which have no axis, it clearly comes nearer to C. elegans than to the very variable and widely-distributed C. obesa, the spicules of the rachis being almost entirely superficial.

Specimen A.

This specimen was obtained in False Bay at a depth of about 25 fathoms.

Total length ..	..	..	145 mm.
Length of Rachis	..	..	120 mm.
,, of Stalk	..	..	25 mm.
Greatest diameter	..	..	23 mm.

There is immense variety in the size and shape of the spicules. The longest of the rod-like spicules which crowd

the superficial parts of the rachis are about 0.3 mm. long by .045 broad, the oval and hour glass-shaped spicules which occur both in the rachis and the stalk are 0.1 mm. in length to .035 mm. in breadth, the otolith-like bodies of the stalk are from tiny specks to .015 mm. in diameter. The long rod-like bodies are of a pale pinkish-brown colour, the others colourless. The autozooids are 10 mm. in length, the tentacles 3 mm. in length.

These measurements are taken from a single beautifully-expanded polyp that was sent separately with the following note :—" This specimen "—(*i.e.*, the one I have described)—" could not be got to expand, but another (the only other found) expanded beautifully, and with the aid of chloral hydrate was killed in this condition, some of the polyps projecting half an inch."

Some of the autozooids on the specimen sent to me were partly expanded, and I have been able to study their anatomy fairly satisfactorily, but the single autozooid of the expanded colony that was not sent to me is a most beautiful object and, I imagine, quite as fully expanded as in the living condition. The most noteworthy feature is the extraordinary length of the Stomodaeum. It extends from the mouth to a very short distance from the base of the expansible part of the autozooid, *i.e.*, about 9 mm. It appears, therefore, to be a much longer stomodaeum than occurs in the Pennatulids which have hitherto been described. It must be remembered, however, that all or nearly all the descriptions of Pennatulid anatomy that have hitherto been published have been based on specimens that were in all probability contracted, and the measurements of length of the parts of the polyps are not to be relied on. The autozooids of the specimen sent to me, although "" expanded," that is to say, not withdrawn below the surface of the Sarcosoma and with their tentacles free, were clearly diminished in volume by muscular tetanus before being killed. They are quite opaque and altogether different ent in appearance from the expanded autozooid that was sent to me separately. Although the stomodaeum of the autozooid of this Cavernularia is, therefore, a long one compared with that of most Alcyonaria, it is doubtful if this is a character which separates it from the other species of the genus or indeed from other Pennatulids allied to it.

The long rod-like spicules give to the sarcosoma of this form a pale pink colour. Without giving too much prominence to colour as a feature in the diagnosis of species, attention may be called to the fact that no mention of any

colours has been made in the description I have read of the other species of Cavernularia, and the specimens I have had the opportunity of examining have all been perfectly white, with the exception of one specimen in the British Museum and the specimens from the Cape described below.

Specimen B.

A smaller specimen obtained in the trawl off Robben Island has a very different appearance. It is much more contracted and wrinkled on the surface. It has none of the pinkish colour noticed in Specimen A, and when cut with a knife seems to be much tougher in consistency. A superficial examination would suggest that this specimen belongs to a different species to Specimen A, but the spicules present the same characters, there is no trace of an axis, and the septa are arranged in a corresponding manner in the two specimens. This specimen, indeed, presents no characters except possibly the proportional length of the rachis, which cannot be accounted for on the supposition that it is very much contracted.

The measurements are of

	Specimen B.	Cavernularia elegans Herklots.
Total length ..	77 mm.	95 mm.
Rachis	51 ,,	66 ,,
Stalk	26 ,,	29 ,,
Greatest Breadth ..	13 ,,	14 ,,

On comparing this specimen with the description of Cavernularia elegans (Herklots) from Japan, it will be noticed that the proportions are almost identical, and there can be no doubt that it belongs to the same species. The only question that is open to doubt is whether our specimens A and B belong to the same species, and, as I have just pointed out, the only character of importance in which they differ from one another is the proportional length of the rachis. It is a well-known fact that the stalk of some Pennatulids is capable of very considerable changes in length and breadth during life; we know that the rachis of some Pennatulids shrivels very considerably when brought on to the deck from

a trawl, but we have no written information at present about the degree of expansion and contraction that the rachis of Cavernularia can exhibit. Judging alone from the structure of the sarcosoma, it is very probable that the rachis is in the living specimens in their normal habitât very much larger than in the best spirit specimens. It may be, then, that the greater length of the rachis in Specimen A may partly be due to its having been killed in a somewhat less contracted condition than Specimen B. It may also be partly due to Specimen A being a larger and therefore an older specimen, the rachis becoming proportionately longer in older specimens as in many other Pennatulids.

My conclusion, therefore, is that these specimens are probably examples of the same species, and that they should be identified with Cavernularia elegans (Herklots).

Specimen B was a female with ova 0.5 mm. in diameter. It was obtained on November 20th, 1897.

Cavernularia obesa (Val.) (Variety).

Plate III., A and B.

Eight specimens out of fifteen obtained on November 19th, 1898, near Port Alfred, lat. 33° 44′ 20″ S., long. 26° 44′ 20″ E., depth 40-43 fathoms, were sent to me.

I consider them to be varieties of the very variable and widely-distributed species Cavernularia obesa (Val).

Two of the specimens are white, four have a purple rachis with a yellow stalk, one is yellow, and one very small one has a pink rachis and pale yellow stalk.

The largest one is purple, 58 mm. in total length and about 6 mm. in greatest diameter, the stalk being 16 mm. in length. Other specimens are 40 mm., 38 mm., 26 mm., in length.

The polyps, which in some of the specimens are beautifully expanded, are colourless, bearing no spicules. There is no axis. Two specimens were dissected, one of them, purple in colour, was male, the other yellow and female.

These very interesting and important little Pennatulids are worthy of further investigation. They appear to be dwarf varieties of a species which has a wide distribution in the Indian and Malay seas. The only specimen which at all resembles them that I have seen is one in the British Museum

presented by Dr. Gwyn Jeffreys, and labelled Cavernularia obesa, var., 40 fathoms Korean Strait. It is orange colour. I hope to be able to find time soon to investigate the anatomy of these species more fully.

HYDROCORALLINAE.

ALLOPORA NOBILIS. Saville Kent.

A fragment of a dried skeleton, 5 inches in height and 2 inches in diameter at the base, was sent to me, together with a smaller fragment preserved in formalin. It is probably identical with Allopora nobilis Saville Kent (15). The specimen Kent described is in the British Museum, but the locality from which it was obtained is not recorded.

The specimen under examination was obtained in the trawl in False Bay at a depth of 30 fathoms. The interesting statement is made in the notes sent to me that "there are evidently large beds, as when the trawl gets on them it is ruined owing to the number of holes torn in it."

Moseley (Phil. Trans., 1878, p. 480) considered that this species was probably identical with Verrill's Allopora venusta from Neah Bay, Washington Territory (17). In both the colour is light red and the branches yellowish at the tips, but the other characters upon which the species are founded are so very variable that it is difficult to express a definite opinion on the point without a careful examination of both type specimens. The discovery, however, that Allopora nobilis occurs at the Cape of Good Hope suggests that the species are distinct. If they are identical the geographical distribution of the species is remarkable.

An examination of sections through the soft parts shows that the specimen is a female. There is not sufficient material, however, for me to make a satisfactory study of the gonophores of this species.

As Moseley pointed out, it is not easy to distinguish the genus Allopora from the genus Stylaster. It is possible that there is a difference between them in the general characters

of the male and female trophodiscs, and, consequently, it is very desirable that as many examples as possible of the two genera should be studied, with the object of discovering whether such a general distinction does exist. I have compared my sections of this species of Allopora with those I made some years ago of Allopora from Norway, and can find no essential points of difference between them. The only Stylaster that I have had an opportunity of examining was a Stylaster gracilis (female) from Torres Straits. This is a very slender form, but it agrees in general features with Allopora.

The verdict, then, on the identity of Allopora and Stylaster must be "not proven," but I would take this opportunity of pointing out that it is male specimens of Stylaster well preserved in spirit that are wanted to settle this interesting point.

This is the only specimen of the Hydrocoralline sent to me from the Cape, and it may be identical with the specimen obtained by the *Gazelle* which Studer considered to belong to the species Allopora oculina of Ehrenberg.

List of the Principal Works referred to in the Text.

1. Lacaze Duthiers, H. Histoire naturelle du Corail. 1864.
2. Marion, A., et Kowalewsky. Documents pour l'histoire embryogénique des Alcyonaires. Ann. Musée de Marseille. Vol. I. 1883.
3. von Koch, G. Die Gorgoniden des Golfes von Neapel.
4. Kölliker, A. Die Pennatulide Umbellula, etc. Festschrift Würzburg. 1874.
5. Kölliker, A. Beitrage zur Kenntniss der Polypen, Phys. Med. Ges. Würzburg, II., ii.
6. Kölliker, A. Icones Histiologicae.
7. Kölliker, A. Anat-system Beschreib der Alcyon. 1872.
8. Koren and Danielssen. Nye Alcyonides, etc. Bergen, 1883.
9. Klunzinger. Die Korallthiere des Roten Meeres. 1877.
10. von Marenzeller. Ueber die Sarcophytum benannten Alcyoniden. Zool. Jahrb. I.
11. May, W. Beiträge zur Systematik und Chorologie der Alcyonaceen, Jen. Zeits XXXIII. 26.

12. Möbius, K. Neue Gorgoniden des Natur-histor Museums zu Hamburg. Nov. Act. Acad. Leop. XXIX. 1862.
13. Moseley, H. N. *Challenger* Rep. Zool. II. 1879.
14. Ridley, S. O. Report on Zoological Collections made in H.M.S. *Alert.* 1884.
15. Saville Kent. Proc. Zool. Soc. 1871.
16. Studer, Th. Uebersicht der Anthozoa Alcyonaria, Monats Akad Wiss, Berlin. 1878.
17. Verrill, A. E. Notes on Radiata, Trans. Conn. Acad. Vol I.
18. Verrill, A. E. Synopsis of Polyps and corals. Proc. Essex Instit. IV., V., and VI.
19. Wright, E. P., and Studer, Th. Alcyonaria of H.M.S. *Challenger.*

Description of the Plates.

Plates I. and II. Two specimens of Melitodes dichotoma (Pall.) to show the variation in the colour due to spicules in the species.

Plate III. Figs. A and B. Two specimens of the Cape variety of Cavernularia obesa × two diam. to show two examples of the great variability in colour exhibited by this species.

Fig. C. Sarcophytum trochiforme (n.s.) × three diam., a remarkable dwarf species of the genus.

Plate IV. Fig. A. Alcyonium antarcticum (W. and S.) × 3.

Fig A′. Two examples of the spicules of A. antarcticum, the one to the right × 150, the one to the left × 300.

Fig. B. Acrophytum claviger (n.g.) slightly enlarged.

Fig. B′. Club-shaped spicule of A. claviger × 160.

Fig. C. Heteroxenia capensis (n. sp.) slightly enlarged. The stalk is covered with an encrusting growth of the Tunicate Leptoclinum speciosum (Herdman).

Plate V. Fig. A. Gorgonia capensis (n.s.) × 2.

Fig. A′. A fragment of a branch × 20, to show the aspect of the verrucâe and the relative proportions of axis and coenenchym.

Fig. A″. Longitudinal section through a portion of a branch showing the embryos (e) in situ ; a. axis ; p. polyps.

Fig. A‴. Spicule of G. capensis × 400.

Fig. B. Two spicules of Gorgonia flammea (E. and S.) × 250.

Fig. C. Spicule of Eunicella papillosa Esp. × 350.

Fig. D. Triradiate spicule of Juncella elongata (Val.) × 100.

Plate VI. Fig. A. Fragment of Primnoisis capensis (Studer) slightly enlarged.

Fig. A′. The same × 17, to show the general appearance of the surface of the coenenchym and the arrangement of the spicules on polyps.

Fig. B. A piece of a terminal branch of Melitodes dichotoma considerably enlarged, to show the form and arrangement of the young polyps.

Figs. C, C′, and C″. Spicules of Sarcophytum trochiforme. C × 660, C′ × 340, C″ × 560.

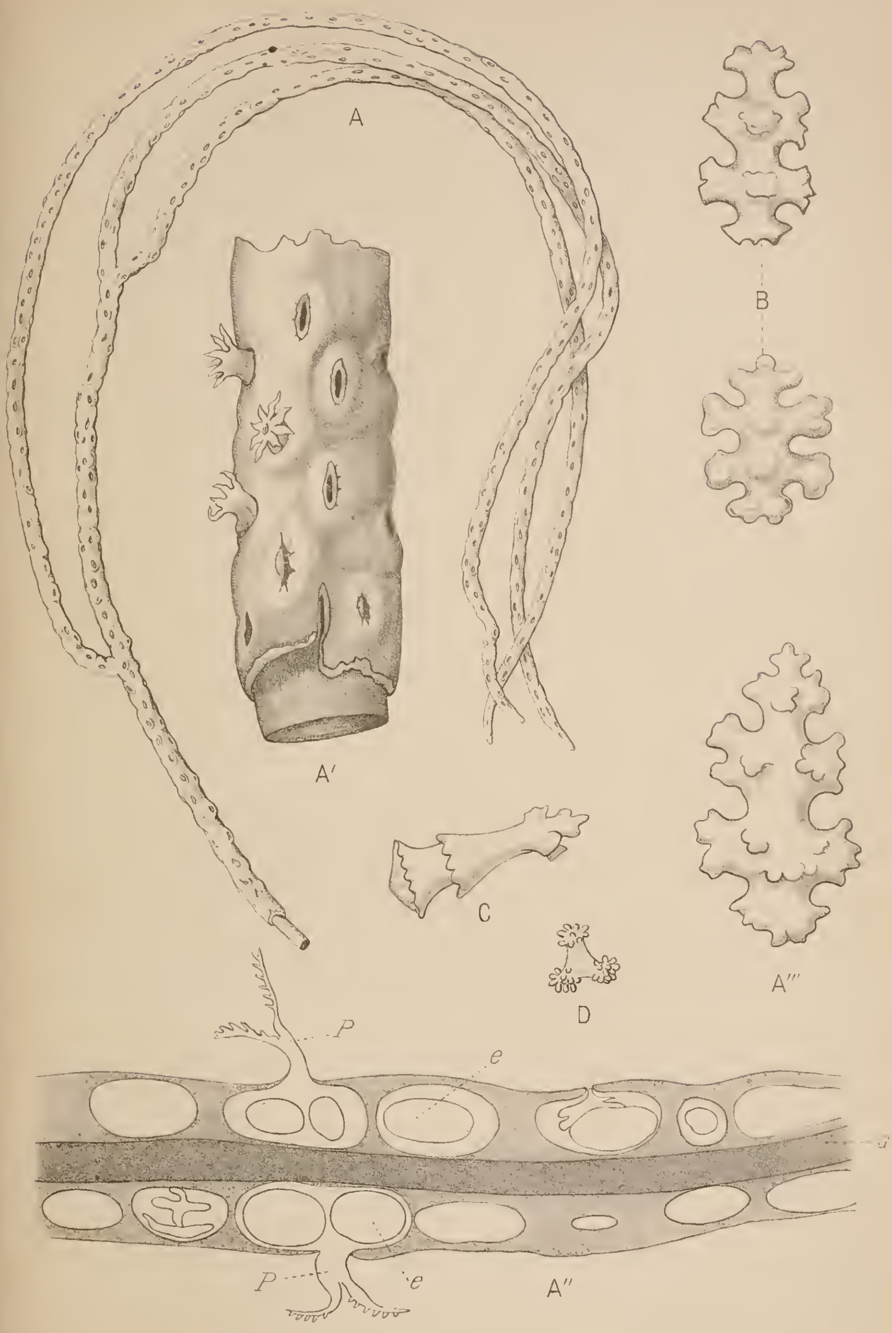
[*Published 20th October*, 1900.]

Melitodes dichotoma (Pallas)

Melitodes dichotoma (Pallas)
Yellow variety

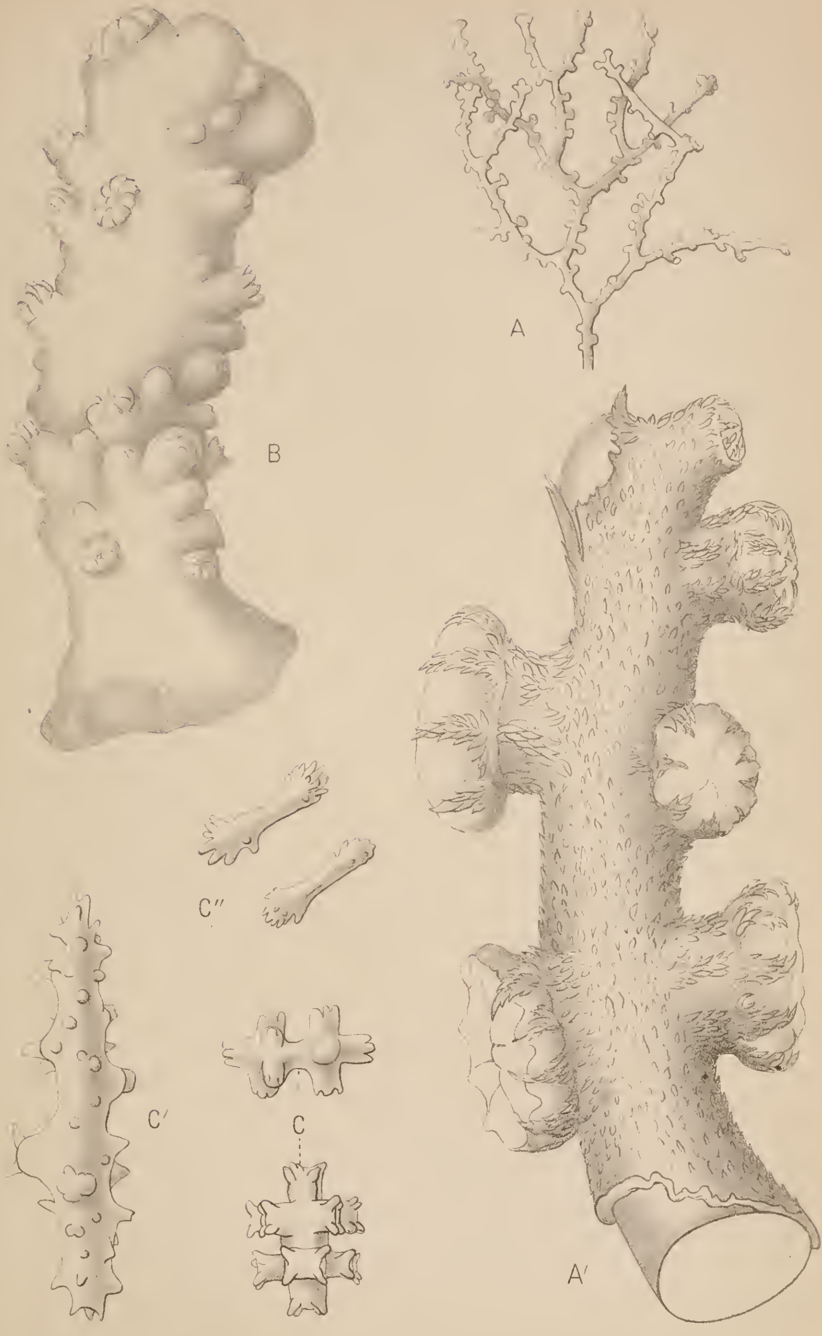
A. [illegible]
B. [illegible]
C. Sarcophytum [illegible] Nov. spec.

A A′. Alcyonium antarcticum W & S
B B′. Acrophytum claviger. Nov gen et spec.
C. Heteroxenia capensis. Nov spec



A A′A″A‴ Gorgonia capensis Nov spec.
B. Gorgonia flammea. Ellis
C. Eunicella papillosa. Esper
D. Juncella elongata. Val.

E. WILSON, CAMBRIDGE



A A′ Primnoisis capensis Studer.
B Melitodes dichotoma Pallas
C C′C″ Sarcophytum trochiforme Nov Spec

E. Wilson, Cambridge

CATALOGUE

OF

FISHES RECORDED FROM SOUTH AFRICA

BY

J. D. F. GILCHRIST, M.A., B.Sc., Ph.D.

The following is a catalogue of fishes hitherto recorded from South Africa. It is intended as a basis for future work and a key to the literature on the subject, rather than a record of all the species now known to occur in this region. Other species contained in the various Museums in South Africa, and the collection procured in the marine work undertaken by the Cape Government, but not recorded, are, therefore, not included.

Some difficulty has been experienced in determining the synonymy owing to imperfect descriptions, and it cannot be hoped that the catalogue is entirely free from errors in this respect.

The plan of arrangement is as follows:—The name adopted is printed in dark type, with the local name under it in brackets. This is followed first by a reference to the author of the specific name, and thereafter to authors who have recorded the fish from South African waters, the locality where procured being mentioned along with the local name adopted (frequently erroneous); where a plate has been given of the species a reference to this has been inserted, whether the specimen described is from South Africa or not.

The following are the chief contractions used:—

Atl. Ichth. Gymn.—Atlas Ichthyologique Gymnodontes (*Bleeker*). 1861-77.

Blgr. i.—*Boulenger, G. A.* Catalogue of the Fishes in the British Museum.

——— Mar. Inv. S. Africa.—Marine Investigations, South Africa.

Blkr. Vische v. d. Kaap.—*Bleeker, P.* Over eenige vischsoorten van de Kaap de Goede Hoop. 1860.

Bl. or *Block.* Ausl. Fische.—*Bloch*, Auslandische Fische. 1785-95.

Cast. Mem.—*Castelnau, F. de.* Memoire sur les Poissons de l'Afrique Australe. 1861.

C. & V. or *Cuv. & Val.*—*Cuvier et Valenciennes.* Histoire Naturelle des Poissons. 1828-49.
Forst. Descr. Anim.—*Forster, J. R.* Descriptiones Animalium. 1844.
Gunth. i., &c.—*Günther, A.* Catalogue of the Fishes in the British Museum, vol. i. viii. 1859-70.
——— Ann. & Mag. Nat. Hist.—Annals and Magazine of Natural History.
——— Proc. Zool. Soc.—Proceedings of the Zoological Society of London.
Lichtenst. Travels.—*Lichtenstein's* Travels in South Africa. 1811.
Pappe. Synops.—*Pappe, L.* Synopsis of the Edible Fishes at the Cape of Good Hope. 1853.
Q. & G. or *Quoy & Gaim.*—*Quoy et Gaimard.*
——— Voy. de l'Astrol. Poiss.—Voyage de l'Astrolabe, Zoologie: Poissons. 1834.
——— Voy. Uran. Zool.—Voyage de l'Auranie, Zoologie: Poissons. 1824.
Rupp. N.W. Fische.—*Ruppell.* Neue Wirbelthiere. Fische. 1837.
Richards. Voy. Samar.—*Richardson, Sir J.* Voyage of H.M.S. Samarang. Fishes. 1848.
——— Ichth. Voy. Ereb. & Terr.—Ichthyology, in Voyage of H.M.SS. Erebus and Terror. 1846.
Risso. Eur. Merid.—Histoire Naturelle de l'Europe Meridionale. 1827.
Schleg. Faun. Jap.—*Temminck and Schlegel,* Fauna Japonica. Poissons. 1833.
Stndch. Ich. Beitr.—*Steindachner, F.* Ichthyologische Beitrage.
——— Verh. Zool. Bot. Ges. Wien.—Verhandlungen der Zoologischen Botanischen Gesellschaft.
——— Sitz. Ak. Wien.—Sitzungsberichte der kaiserl. Akademie der Wissenschaften in Wien.
Web. M. Zool. Jahrb.—*Weber, Max.* Zoologische Jahrbücher.

———:o:———

SYSTEMATIC INDEX.

Sub-class I. TELEOSTEI.

Order I. ACANTHOPTERYGII.

FAM. 1. PERCIDAE.

	Page
1. Kuhlia	105
1. tæniura, *C. & V.*	105
2. malo, *C. & V.*	105
2. Acanthistius	105
1. sebastoides, *Cast.*	105
2. brasilianus, *C. & V.*	106
3. Parascorpis	106
1. typus, *Blkr.*	106
4. Atyposoma	106
1. gurneyi, *Blgr.*	106
5. Polyprion	106
1. prognathus, *Forst.*	106
6. Epinephelus	106
1. tæniops, *C. & V.*	106
2. ascensionis, *Osb.*	106
3. gigas, *Brun.*	107
4. tauvina, *Forsk.*	107
5. lanceolatus, *Bl.*	107
7. Serranus	107
1. cabrilla, *C. & V.*	107
2. hepatus, *Linn.*	107
8. Rhypticus	107
1. saponaceus, *Bl. Schn.*	107
9. Priacanthus	108
1. boops, *Forst.*	108
10. Pentaceros	108
1. richardsonii, *Smith*	108
2. capensis, *C. & V.*	108
11. Ambassis	108
1. urotænia, *Blkr.*	108
12. Mesoprion	108
1. johnii, *Bl.*	108

FAM. 2. PRISTIPOMATIDAE.

	Page
1. Dentex	108
1. argyrozona, *C. & V.*	108
2. rupestris, *C. & V.* (?)	109
3. brevis, *Kner*	109
4. macrocephalus, *Lacep.*	109
5. filosus, *Valenc.*	109
6. macrodens, *Cast.*	109
7. præorbitalis, *Gunth.*	109
2. Therapon	110
1. theraps, *C. & V.*	110
2. jarbua, *Forsk.*	110
3. Datnia	110
1. argentea, *C. & V.*	110
4. Pristipoma	110
1. operculare, *Gunth. & Pl.*	110
2. suillum, *C. & V.*	110
5. Cæsio	110
1. axillaris, *Blgr.*	110

FAM. 3. SPARIDAE.

	Page
1. Cantharus	111
1. blochii, *C. & V.*	111
2. emarginatus, *C. & V.*	111
3. elongatus, *Cast.*	111
4. castelnaui, *Blkr.*	111
2. Chrysophrys	111
1. globiceps, *C. & V.*	111
2. cristiceps, *C. & V.*	112
3. gibbiceps, *C. & V.*	112
4. laniarius, *Cast.*	112
5. natalensis, *Cast.*	112
6. algœnsis, *Cast.*	113
7. holubi, *Stndch.*	113
3. Sargus	113
1. cervinus, *Lowe*	113
2. capensis, *Smith*	113
3. rondeletii, *C. & V.*	113
4. durbanensis, *Cast.*	114
5. holubi, *Stndch.*	114
4. Pagrus	114
1. laniarius, *C. & V.*	114
2. unicolor, *Q. & G.*	114
3. caffer, *Cast.*	114
4. laticeps, *C. & V.*	114
5. Pagellus	115
1. lithognathus, *C. & V.*	115
2. erythrinus, *Linn.*	115
3. mormyrus, *Linn*	115
4. armatus, *Cast.*	115
5. fascialis, *Cast.*	115
6. Box	116
1. salpa, *Linn.*	116
7. Pachymetopon	116
1. grande, *Gunth.*	116
8. Dipterodon	116
1. capensis, *C. & V.*	116

	Page
9. Gymnocrotaphus	116
1. curvidenis, *Gunth*	116
10. Pimelepterus	116
1. fuscus, *C. & V.*	116
11. Charax	117
1. capensis, *Cast.*	117
12. Boopsoidea	117
1. inornata, *Cast.*	117
13. Crenidens	117
1. forskalii, *C. & V.*	117
14. Pagrichthys	117
1. castelnaui, *Blkr.*	117

FAM. 4. CIRRHITIDAE.

1. Chilodactylus	117
1. fasciatus, *Lacep*	117
2. brachydactylus, *C. & V.*	117
3. grandis, *Gunth*	118
2. Cheilodactylus	118
1. multiradiatus, *Cast.*	118
3. Cirrhites	118
1. forsteri, *Bl.*	118
2. arcatus, *C. & V.*	118

FAM. 5. TRIGLIDAE.

1. Sebastes	118
1. capensis, *C. & V.*	118
2. maculatus, *C. & V.*	119
2. Pterois	119
1. volitans, *Linn.*	119
3. Agriopus	119
1. torvus, *Gronov*	119
2. verrucosus, *C. & V.*	119
3. spinifer, *Smith*	120
4. multidentatus, *Cast.*	120
4. Platycephalus	120
1. insidiator, *Forsk.*	120
5. Prionotus	120
1. pusillus, *Cast*	120
6. Trigla	120
1. kumu, *Less*	120
2. peronii, *C. & V.*	120
3. capensis, *C. & V.*	120
7. Trachinus	121
1. draco, *Linn.*	121

FAM. 6. HOPLEGNATHIDAE.

1. Hoplegnathus	121
1. conwayi, *Richards.*	121

FAM. 7. BERYCIDAE.

1. Holocentrum	121
1. sammara, *Forsk*	121

FAM. 8. SCIAENIDAE.

1. Umbrina	121
1. cirrhosa, *Linn.*	121
2. capensis, *Pappe*	122
2. Sciæna	122
1. aquila, *Risso*	122
3. Otolithus	122
1. æquidens, *C & V.*	122
4. Corvina	122
1. punctata, *Cast.*	122

FAM. 9. XIPHIIDAE.

1. Xiphias	123
1. gladius, *Linn*	123
2. Histiophorus	123
1. gladius, *Brouss*	123
2. granulifer, *Cast*	123
3. herschelii, *Gray.*	123

FAM. 10. SPHYRAENIDAE.

1. Sphyræna	123
1. jello, *C. & V.*	123
2. vulgaris, *C. & V.*	124
3. commersonii, *Cast*	124

FAM. 11. TRICHIURIDAE.

1. Thyrsites	124
1. atun, *Euphr*	124
2. Lepidopus	124
1. caudatus, *Euphr*	124

FAM. 12. CARANGIDAE.

1. Caranx	125
1. trachurus, *Lacep.*	125
2. hippos, *Linn*	125
2. Seriola	125
1. lalandii, *C. & V.*	125
3. Porthmeus	125
1. argenteus, *C. & V.*	125
4. Lichia	126
1. amia, *Linn*	126
2. glauca, *Linn*	126
5. Temnodon	126
1. saltator, *Linn.*	126
2. conidens, *Cast.*	126
6. Psettus	126
1. argenteus, *Linn*	126
2. falciformis, *Lacep.*	127

FAM. 13. SCOMBRIDAE.

1. Scomber	127
1. scomber, *Linn.*	127
2. pneumatophorus, *De la Roche*	127
2. Thynnus	127
1. pelamys, *Linn.*	127
2. alalonga, *Risso*	128
3. Pelamys	128
1. sarda *Bl*	128
4. Cybium	128
1. commersonii, *Lacep*	128
2. flavo-brunneum, *Smith.*	128
5. Naucrates	128
1. ductor, *Linn*	128
6. Echeneis	128
1. remora, *Linn.*	128
2. clypeata, *Gunth.*	129
7. Cubiceps	129
1. capensis, *Smith*	129

Page

8. Zeus 129
  1. capensis, *C. & V.* 129
9. Stromateus 129
  1. capensis, *Pappe* 129
10. Stromatoidea 129
  1. layardi, *Cast* 129
11. Coryphæna 129
  1. hippurus, *Linn* 129
  2. fasciolata, *C. & V.* 129
12. Brama 130
  1. raii, *Bl.* 130

FAM. 14. BATRACHIDAE.

1. Batrachus 130
  1 apiatus, *C. & V.* 130

FAM. 15. PEDICULATI.

1. Lophius 130
  1. piscatorius, *Linn* 130
  2. upsicephalus, *Smith* 130
  3. vomerinus, *C. & V.* 130
2. Antennarius 130
  1. marmoratus, *Gunth* 130
  2. ranina, *Gunth.* 130

FAM. 16. GOBIIDAE.

1. Gobius 131
  1. nudiceps, *C. & V.* 131
  2. giuris, *Buch.* 131
  3. dewaali, *M. Web* 131
  4. gilchristi, *Blgr* 131
  5. spectabilis, *Gunth.* 131
  6. olivaceus, *Cast.* 131
  7. capensis, *Cast.* 132
  8. gymnauchen, *M. Web* 132
  9. platynotus, *Gunth.* 132
2. Callionymus 132
  1. costatus, *Blgr.* 132

FAM. 17. BLENNIIDAE.

1. Clinus 132
  1. superciliosus, *Linn.* 132
  2. heterodon, *C. & V.* 132
  3. cottoides, *C. & V.* 133
  4. capensis, *C. & V.* 133
  5. acuminatus, *C. & V.* 133
  6. latipinnis, *C. & V.* 133
  7. brachycephalus, *C. & V.* 133
  8. dorsalis, *Cast* 133
  9. anguillaris, *C. & V.* 133
  10. pantherinus, *Cast* 134
  11. marmoratus, *Cast* 134
2. Cristiceps 134
  1. argentatus, *Risso* 134
3. Blennius 134
  1. cornutus, *Linn* 134
  2. capito, *C. & V.* 134
  3. casteneus, *Cast* 134
  4. crinitus, *C. & V.* 134
  5. bifilum, *Gunth* 135
4. Salarias 135
  1. dussumieri, *Gunth* 135

Page

FAM. 18. ATHERINIDAE.

1. Atherina 135
  1. breviceps, *C & V.* 135
  2. parvipinnis, *C. & V.* 135

FAM. 19. MUGILIDAE.

1. Mugil 135
  1. capensis, *C. & V.* 135
  2. multilineatus, *Smith* 136
  3. constantiæ, *C. & V.* 136
  4. capito, *Cuv* 136
  5. richardsonii, *Smith* 136
  6. smithii, *Gunth* 137
  7. camptosienis, *Cast.* 137
  8. crenilepis, *Cast* 137
  9. radians, *Cast* 137
  10. natalensis, *Cast* 137

FAM. 20. CENTRISCIDAE.

1. Centriscus 137
  1. scolopax, *Linn* 137

FAM. 21. GOBIESOCIDAE.

1. Chorisochismus 138
  1. dentex, *Pall* 138

FAM. 22. LABYRINTHICI.

1. Spirobranchus 138
  1. capensis, *C. & V.* 138
2. Ctenopoma 138
  1. microlepidotum, *Gunth* 138

FAM. 23. TRACHYPTERIDAE.

1. Regalecus 138
  1. gladius, *Walb.* 138

FAM. 24. LOPHOTIDAE.

1. Lophotes 139
  1. cepedianus, *Giorna* 139
  2. fiskii, *Gunth* 139

FAM. 25. POMACENTRIDAE.

1. Glyphidodon 139
  1. sordidus, *Forsk* 139

FAM. 26. LABRIDAE.

1. Novacula 139
  1. cultrata, *C. & V.* 139
  2. argentimaculata, *Stndch* 139
2. Julis 140
  1. hebraica, *Lacep* 140
  2. trilobata, *Lacep* 140
  3. güntheri, *Blkr.* 140

FAM. 27. GERRIDAE.

1. Gerres 140
  1. longirostris, *Rapp* 140

Page

FAM. 28. CICHLIDAE.

1. Tilapia 140
 1. sparrmanni, *Smith.* 140
 2. nilotica, *Linn.* 141
 3. natalensis, *M. Web* 141
 4. philander, *M. Web* 141
2. Paratilapia 141
 1. moffati, *Cast* 141
 2. thumbergii, *Cast.* 142
3. Chromidotilapia 142
 1. frederici, *Cast* 142
4. Hemichromis 142
 1. fasciatus, *Peters* 142
 2. bimaculatus, *Gill* 142
5. Chromys 142
 1. sparmanni, *Cast* 142
 2. andersonii, *Cast* 142
 3. chapmani, *Cast* 142
 4. smithii, *Cast.* 142
 5. lavaillanti, *Cast* 142

Order II. ANACANTHINI.

FAM. 1. GADIDAE.

1. Merluccius 143
 1. vulgaris, *Flem.* 143
2. Genypterus 143
 1. capensis, *Smith* 143
3. Motella 143
 1. capensis, *Kaup* 143
4. Algoa 144
 1. viridis, *Cast.* 144

FAM. 2. PLEURONECTIDAE.

1. Synaptura 144
 1. pectoralis, *Kaup.* 144
 2. microlepis, *Blkr* 144
 3. marginata, *Blgr.* 144
 4. zebra, *Bl* 144
2. Cynoglossus 144
 1. capensis, *Kaup* 144
3. Solea 145
 1. bleekeri, *Blgr* 145
4. Arnoglossus 145
 1. capensis, *Blgr.* 145
5. Achirus 145
 1. capensis, *Kaup* 145
6. Pseudorhombus 145
 1. arsius, *Blkr.* 145

Order III. PHYSOSTOMI.

FAM. 1. SILURIDAE.

1. Eutropius 146
 1. depressirostris, *Peters* 146
2. Clarias 146
 1. gariepinus, *Burch* 146
 2. theodorae, *M. Web* 146
3. Galeichthys 146
 1. feliceps, *C. & V.* 146
 2. ater, *Cast.* 147

Page

FAM. 2. CYPRINIDAE.

1. Abrostomus 147
 1. umbratus, *Smith.* 147
 2. capensis, *Smith* 147
2. Labeo 147
 1. sicheli, *Cast.* 147
 2. cafer, *Cast* 147
3. Barbus 148
 1. burchelli, *Smith.* 148
 2. capensis, *Smith* 148
 3. marequensis, *Smith* 148
 4. holubi, *Stndch.* 148
 5. paludinosus, *Peters* 148
 6. multimaculatus, *Stndch.* 149
 7. serra, *Peters* 149
 8. afer, *Peters* 149
 9. gobionoides, *C. & V.* 149
 10. unitæniatus, *Gunth* 149
 11. trimaculatus, *Peters* 150
 12. anoplus, *M. Web* 150
 14. motebensis, *Stndch.* 150
 15. viviparus, *M. Web.* 150
 16. gurneyi, *Gunth* 150
 17. bynni, *C. & V.* 150
 18. natalensis, *Cast* 151
 19. kurumanni, *Cast.* 151
 20. breijeri, *M. Web* 151
4. Cyprinus 151
 1. longicaudis, *Cast.* 151
5. Carassius. 151
 1. auratus, *Linn* 151

FAM. 3. STERNOPTYCHIDAE.

1. Argyropelecus 151
 1. olfersii, *Cuv.* 151

FAM. 4. SCOMBRESOCIDAE.

1. Belone 152
 1. capensis, *Gunth* 152
 2. natalensis, *Gunth* 152
2. Scombresox 152
 1. rondeletii, *C. & V.* 152
 2. saurus, *Walb* 152
3. Hemiramphus 152
 1. obesus, *Cast.* 152
4. Exocoetus 152
 1. evolans, *Linn* 152
 2. altipinnis, *C. & V.* 152
 3. longipinnis, *Cast.* 152
 4. chloropterus, *C. & V.* 153

FAM. 5. GALAXIIDAE.

1. Galaxias 153
 1. capensis, *Stndch.* 153

FAM. 6. GONORHYNCHIDAE.

1. Gonorhynchus 153
 1. greyi, *Richards* 153

FAM. 7. CLUPEIDAE.

1. Clupea 153
 1. ocellata, *Pappe* 153
2. Engraulis 154
 1. holodon, *Blgr.* 154

	Page
3. Albula	154
1. conorynchus, *Bl.*	154
4. Elops	154
1. saurus, *Linn*	154

FAM. 8. MURAENIDAE.

1. Ophichthys	154
1. serpens, *Linn*	154
2. Anguilla	154
1. delalandi, *Kaup.*	154
2. labiata, *Peters.*	155
3. Muræna	155
1. nebulosa, *Ahl.*	155
2. flavomarginata, *Rupp*	155
4. Leptocephalus	155
1. capensis, *Kaup*	155
2. morisii, *Gmel.*	155

Order IV. LOPHOBRANCHII.

FAM. 1. SYNGNATHIDAE.

1. Syngnathus	156
1. acus, *Linn*	156
2. phlegon, *Risso*	156
3. pelagicus, *Osb.*	156
4. temminckii, *Kaup.*	156
2 Hippocampus	156
1. capensis, *Blgr.*	156

Order V. PLECTOGNATHI.

FAM. 1. SCLERODERMI.

1. Balistes	157
1. maculatus, *Gm*	157
2. vetula, *Linn.*	157
3. mitis, *Benn*	157
2. Monacanthus	157
1. setifer, *Benn*	157
2. pardalis, *Rupp*	157
3. Ostracion	158
1. concatenatus *Bl*	158
2. diaphanus, *Bl.*	158
3. cornutus, *Linn*	158

FAM. 2. GYMNODONTES.

1. Orthagoriscus	158
1. mola, *Linn*	158
2. truncatus, *Retz*	159
2. Dicotylichthys	159
1. punctulatus, *Kaup.*	159
3. Chilomycterus	159
1. echinatus, *Gronov*	159
2. antennatus, *Cuv.*	159
3. geometricus, *Bl*	159
4. orbicularis, *Bl.*	159
4. Diodon	159
1. maculatus, *Gunth.*	159
2. maculifer, *Kaup.*	160
3. spinosissimus, *Cuv.*	160
4. hystrix, *Linn*	160
5. Tetrodon	160
1. blochii, *Cast*	160
2. cutaneus *Gunth*	160
3. honckenii, *Bl*	160
4. lunaris, *Bl. Schn*	161
5. lagocephalus, *Linn*	161
6. stellatus, *Blkr.*	161

Sub-class II. CHONDROPTERYGII.

Order I. HOLOCEPHALA.

FAM. 1. CHIMAERIDAE.

1. Chimæra	162
1. monstrosa, *Linn.*	162
2. Callorhynchus	162
1. antarcticus, *Lacep*	162

Order II. PLAGIOSTOMATA.

FAM. 1. CARCHARIIDAE.

1. Carcharias	162
1. acutus, *Rupp.*	162
2. melanopterus, *Q. & G*	163
2. Galeus	163
1. canis, *Bonap*	163
3. Leptocarcharias	163
1. smithii, *M. & H.*	163
4. Mustelus	163
1. lævis, *Risso.*	163
2. vulgaris, *M. & H*	163

FAM. 2. LAMNIDAE.

1. Lamna	163
1. glauca, *M. & H.*	163
2. Carcharodon	164
1. rondeletii, *M. & H.*	164
3. Odontaspis	164
1. americanus, *Mitch.*	164
4. Alopecias	164
1. vulpes, *Gm.*	164

FAM. 3. SCYLLIDAE.

1. Scyllium	164
1. africanum, *Gm.*	164
2. edwardsii, *Cuv.*	164
3. bivium, *M. & H.*	165
4. capense, *M. & H*	165
2. Chiloscyllium	165
1. indicum, *Gm*	165

FAM. 4. RHINODONTIDAE.

1. Rhinodon	165
1. typicus, *Smith.*	165

Page

FAM. 5. NOTIDANIDAE.

1. Notidanus 165
  1. indicus, *Cuv*. 165

FAM. 6. SPINACIDAE.

1. Acanthias 166
  1. blainvillei, *Risso*. 166
2. Echinorhinus 166
  1. spinosus, *Gm*. 166

FAM. 7. PRISTIDAE.

1. Pristis 166
  1. pectinatus, *Latham*. 166

FAM. 8. RHINOBATIDAE.

1. Rhinobatus 166
  1. obtusus, *M* & *H*. 166
  2. columnæ, *M*. & *H*. 167
  3. blochii. *M*. & *H*. 167

FAM. 9. TORPEDINIDAE.

1. Torpedo 167
  1. marmorata, *Risso*. 167
  2. smithii, *Gunth*. 167

Page

2 Narcine, *Forst*. 167
  1. brasiliensis, *Olfers*. 167
3. Astrape 168
  1. capensis, *Gm*. 168

FAM. 10. RAJIDAE.

1. Raja 168
  1. capensis, *M*. & *H*. 168
  2. smithii, *M*. & *H*. 168
  3. maculata, *Montag*. 168

FAM. 11. TRYGONIDAE.

1. Trygon 168
  1. pastinaca, *Linn*. 168
  2. purpurea, *M*. & *H*. 169
  3. uarnak, *Forsk*. 169

FAM. 12. MYLIOBATIDAE.

1. Myliobatis 169
  1. aquila, *Linn*. 169

Sub-class III. CYCLOSTOMATA.

FAM. 1. MYXINIDAE.

1. Bdellostoma 169
  1. cirrhatum, *Forst*. 169

NUMBER OF FAMILIES	....	55
,, ,, GENERA	....	164
,, ,, SPECIES	....	336

CATALOGUE

OF

FISHES RECORDED FROM SOUTH AFRICA.

———:o:———

Sub-class I—**TELEOSTEI.**

Order I—ACANTHOPTERYGII.

FAM.: **PERCIDÆ.**

Kuhlia taeniura, C. & V.

Dules tæniurus, *Cuv. & Val.* iii. p. 114.
Kuhlia tæniura, *Blgr.* i. p. 39. Port Natal, S. Africa.
Dules argenteus, *Day, Fishes of India*, pl. xviii. fig. 2.

Kuhlia malo, C. & V.

Dules malo, *Cuv. & Val.* vii. p. 479.
Kuhlia malo, *Blgr.* i. p. 40. S. Africa.
Moronopsis sandvicensis, *Stndchnr. Sitzb. Ak. Wien.* xcvi. 1887, pl. i. fig. 1.

Acanthistius sebastoides, Cast.

Serranus sebastoides, *Cast. Mem.* p. 3. Algoa Bay and Simon's Bay.
Serranus cuvieri, *Cast. l.c.* p. 2. Algoa Bay.
Serranus cuvieri, *A. Smith, South African Quart. Journ.* Vol. I. (1830).
Serranus cuvieri, *Pappe, Synops*, p. 23. East Coast of Africa, particularly Algoa Bay.

Plectropoma sebastoides, *Studchnr. Sitzb. Ak. Wien.* lxxxiii. 1881, p. 201, pl. i. Table Bay.
Acanthistius sebastoides, *Blgr.* i. p. 141. Cape Seas.

Acanthistius brasilianus, C. & V.

Plectropoma brasilianum, *Cuv. & Val.* ii. p. 397.
Plectropoma aculeatum, *Cuv. & Val.* vi. p. 523. Agulhas Bank.
Acanthistius brasilianus, *Gunth.* i. p. 163.
Acanthistius brasilianus, *Blgr.* i. p. 141.
Acanthistius brasilianus, *Bull. U.S. Fish Comm.* viii. p. 348.

Parascorpis typus, Blkr.

Parascorpis typus, *Blkr., Arch. Neerl.* x. 1875. p. 381, pl. vii. Cape of Good Hope.
Parascorpis typus, *Blgr.* i. p. 145 (quoted).

Atyposoma gurneyi, Blgr.

Atyposoma gurneyi, *Blgr. Annals. S. A. Museum.* i. pt. 2, p. 379, pl. ix. (1899). False Bay.

Polyprion prognathus, Forst.
(Bafaro).

Perca prognatha, *Forst. in Bl. Schn, Syst, Ichth.* p. 301 (1801), and *Descr. Anim.* p. 309 (1844).
Polyprion cernium, *Cuv. & Val.* iii. p. 21, pl. 42. Cape of Good Hope.
Polyprion prognathus, *Blgr.* i. p. 150 (quoted).

Epinephelus taeniops, C. & V.

Serranus tæniops, *Cuv. & Val.* ii. p. 370.
Serranus tæniops, *Gunth.* i. p. 121. S. Africa.
Epinephelus tæniops, *Blgr.* i. p. 186. S. Africa.

Epinephelus ascensionis, Osb.

Trachinus adscensionis, *Osbeck, Voy. China*, ii. p. 96 (1771).
Serranus trimaculatus, part., *Gunth.* i. p. 109. Cape Seas.
Epinephelus ascensionis, *Blgr.* i. p. 228. Cape Seas.
Serranus clathratus, *Goode Fish. Industr. U.S. Sect.* 1. pl. clxvi.

Epinephelus gigas, Brun.

Perca gigas, *Brunnich, Ichth, Massil.* p. 65 (1768).
Serranus gigas, *Gunth.* i. p. 132. Cape of Good Hope.
Serranus gigas, *Sitzb. Ak. Wien.* lxxiv. 1876, p. 175. Cape of Good Hope.
Epinephelus gigas, *Blgr.* i. p. 231. Cape of Good Hope and Port Natal.
Serranus gigas, *Cuv. & Val.* ii. p. 270, pl. xxxiii.

Epinephelus tauvina, Forsk.

Perca tauvina, *Forsk. Descr. Anim.* p. 39 (1775).
? Serranus chabaudi, *Cast. Mem.* p. 3. Mouth of Zwartkops River.
Epinephelus tauvina, *Blgr.* i. p. 244. Port Natal.
Serranus salmonoides, *M. Web. Zool. Jahrb. Bd.* x., *Heft* 2, p. 142. Mouth of Illovo River, Natal.
Serranus salmonoides, *Day, Fishes of India*, pl. iv. fig. 3.

Epinephelus lanceolatus, Bl.

Holocentrus lanceolatus, *Bloch, Ausl. Fische*, iv. p. 92, pl. cclxii. fig. 1 (1790).
Epinephelus lanceolatus, *Blgr.* i. p. 251. Port Natal.

Serranus cabrilla, C. & V.

Serranus cabrilla, *Cuv. & Val.* ii. p. 223, pl. xxix.
Serranus novemcinctus, *Kner, Novara, Fische*, p. 17, pl. ii. fig. 1. Cape Town.
Serranus cabrilla, *Jordan, Bull. U.S. Fish. Comm.* viii. p. 411.

Serranus hepatus, Linn.

Labrus hepatus, *Linn. S.N.* i. p. 474 (1766).
Centropristis hepatus, *Gunth.* i. p. 84. Cape of Good Hope.
Holocentrus striatus, *Bloch, Ausl. Fische.* pl. ccxxxv. fig. 1.

Rhypticus saponaceus, Bl. Schn.

Anthias saponaceus, *Bl. Schn. Syst.* p. 310 (1801).
Rhypticus saponaceus, *Gunth.* i. p. 172. Cape of Good Hope.
Rhypticus saponaceus, *Blgr.* i. p. 348. Cape of Good Hope.

Priacanthus boops, Forst.

Anthias boops, *(Forst.), Bl. Schn. Syst.* p. 308 (1801).
Priacanthus japonicus, *Gunth.* i. p. 217. Cape Seas.
Priacanthus boops, *Blgr.* i. p. 357. Cape of Good Hope.
Priacanthus boops, *Sauvage, Madagascar Fishes,* pl. xiv. fig. 1. 1891.

Pentaceros richardsonii, Smith.

Pentaceros richardsonii, *Smith, Illustr. Zool. S. Africa,* pl. 21. Cape Point.
Pentaceros richardsonii, *Gunth.* i. p. 212 (quoted).

Pentaceros capensis, C. & V.

Pentaceros capensis, *Cuv. & Val.* iii. p. 30, pl. 43. Cape of Good Hope
Pentaceros capensis, *Gunth.* i. p. 212 (quoted).

Ambassis urotaenia, Blkr.

Ambassis urotænia, *Blkr. Amb. & Cer.* p. 257.
Ambassis urotænia, *M. Web. Zool. Jahr. Bd.* x., *Heft* 2, p. 142 (1897). Mouth of Umhloti River, Natal.

Mesoprion johnii, Bl.

Anthias johnii, *Bloch,* t. 318.
Mesoprion johnii, *Gunth.* i. p. 200. Cape Seas.
Mesoprion unimaculatus, *Quoy. & Gaim. Voy. de l'Astrol. Poiss.* p. 665, pl. 5. f. 3.

FAM.: **PRISTIPOMATIDÆ.**

Dentex argyrozona, C. & V.
(Silver-fish).

Dentex argyrozona, *Cuv. & Val.* vi. p. 235. Cape of Good Hope.
Dentex argyrozona, *Smith, Illustr. Zool. S. Africa,* pl. 19. Silver Fish. East and West Coast of South Africa.

Dentex argyrozona, *Pappe, Synops.* p. 15. Silver Fish. Common on Cape market.
Dentex argyrozona, *Cast. Mem.* p. 29. Silver Fish. In Table Bay and Simon's Bay all the year.
Dentex argyrozona, *Blkr. Vische v.d. Kaap.* p. 59.
Dentex argyrozona, *Kner, Novara,* p. 63. The Cape.

Dentex rupestris, C. & V. (*)
(Seventy-four).

Dentex rupestris, *Cuv. & Val.* vi. p. 231. Rood-steen brasse. Cape.
Dentex rupestris, *Cast. Mem.* p. 28. Seventy-four of Cape and Silver Fish of Algoa Bay. Agulhas Bank, Algoa Bay, Kalk Bay. Sometimes said to be caught in Table Bay.

Dentex brevis, Kner.

Dentex (rupestris, *C. & V.* ?) brevis, *Kner, Novara,* p. 61. Cape of Good Hope.
? Dentex rupestris, *Gunth.* i. p. 370. Cape Seas.

Dentex macrocephalus, Lacep.

Labrus macrocephalus, *Lacep.* iii. p. 480, pl. 26. f. 1.
Dentex macrocephalus, *Cuv. & Val.* vi. p. 232.
Dentex macrocephalus, *Cuv. Regne. An. Ill. Poiss.* pl. 35. f. 2. Hab.—?
Dentex macrocephalus, *Gunth.* i. p. 366.
Dentex macrocephalus, *Blkr. Fische v.d. Kaap.* p. 52.

Dentex filosus, Valenc.

Dentex filosus, *Valenc. in Web. Iles. Canar. Poiss.* p. 37.
Dentex filamentosus, *Valenc.* l.c. pl. 6.
Dentex filosus, *Gunth.* i. p. 371. Cape Seas.

Dentex macrodens, Cast.

Dentex macrodens, *Cast. Mem.* p. 30. Algoa Bay.

Dentex præorbitalis, Gunth.

Dentex præorbitalis, *Gunth.* i. p. 368. Cape Seas.

---

*Note.—There is some uncertainty amongst authors as to the naming of the Seventy-four, the Red Steenbras, the Panga and the Dageraad, which can only be cleared up by reference to the type specimens.

Therapon theraps, C. & V.

Therapon theraps, *Cuv. & Val.* iii. p. 129, pl, 53.
Therapon theraps, *Gunth.* i. p. 274. False Bay. Voy. of H.M.S. "Fly."
Therapon theraps, *Day, Fishes of India,* pl. xviii. fig. 6.

Therapon jarbua, Forsk.

Sciæna jarbua, *Forsk. Desc. Anim.* p. 50.
Therapon servus, *Gunth.* i. p. 278. Cape Seas.
Therapon jarbua, *Day, Fishes of India,* pl. xviii. fig. 4.

Datnia argentea, C. & V.

Datnia argentea, *Cuv. & Val.* iii. p. 139. pl. 54.
Therapon argenteus, *Gunth.* i. p. 283. Cape Seas.
Datnia argentea, *Day, Fishes of India,* pl. xviii. fig. 7.

Pristipoma operculare, Gunth. & Pl.

Pristipoma operculare, *Gunth. & Pl. Fishes of Zanzibar,* p. 24, pl. iv. fig. 1. Two in British Museum from Port Natal.
Pristipoma operculare, *Day, Fishes of India,* p. 76, pl. xx. fig. 2.

Pristipoma suillum, C. & V.

Pristipoma suillum, *Cuv. & Val.* ix. p. 482.
Pristipoma operculare, *Day, Fishes of India,* p. 76. "A specimen of P. suillum C.V. at Berlin from the Cape of Good Hope makes it doubtful whether P. operculare may not prove to be a variety of that species."

Cæsio axillaris, Blgr.

(Windtoy).

Cæsio axillaris, *Blgr. Mar. Inv. S. Africa,* p. 10, pl. False Bay.
? Cantharus blochii, *Pappe,* (non *C.V.*) *Synops.* p. 15. Windtoy. Most frequently caught in winter.
? Cantharus brama, *Cast. Mem.* p. 31. Windtoy. Very rare, and not found in Table Bay, except after strong winds.

Fam.: SPARIDÆ.

Cantharus blochii, C. & V.
(Hottentot).

Sparus brama, *Bloch*, pl. 279 (not descr.).
Cantharus blochii, *Cuv. & Val.* vi. p. 339. Cape.
Cantharus blochii, *Gunth.* i. p. 416. Cape Seas.
Cantharus blochii, *Kner, Novara.* p. 24. Cape of Good Hope.

Cantharus emarginatus, C. & V.
(Steenje).

Cantharus emarginatus, *Cuv. & Val.* vi. p. 338.
Cantharus emarginatus, *Gunth.* i. p. 416. Cape Seas. ?
Cantharus emarginatus, *Pappe, Synops.* p. 15. Dasje. Rare in Table Bay, but more frequently caught in several bays to the East of the Cape.
Cantharus emarginatus, *Kner, Novara.* p. 73. Cape of Good Hope.

Cantharus elongatus, Cast.

Cantharus elongatus, *Cast. Mem.* p. 32.

Cantharus castelnaui, Blkr.

Cantharus castelnaui, *Blkr. Vische v.d. Kaap*, pp. 52, 59.

Chrysophrys globiceps, C. & V.
(White Stumpnose).

Chrysophrys globiceps, *Cuv. & Val.* vi. p. 100. Cape of Good Hope.
Sparus auratus, *Bloch. Ausl. Fische*, tab. 266. See C.V.
Chrysophrys globiceps, *Blkr. Vische v.d. Kaap.* p. 62.
Chrysophrys globiceps, *Pappe, Synops.* p. 13. Stompneus. Caught in great abundance in summer at the Cape.
Chrysophrys globiceps, *Cast. Mem.* p. 23. Stompneus. Common in the Cape market, especially during the summer.
Chrysophrys globiceps, *Gunth.* i. p. 485. Cape of Good Hope.

Chrysophrys cristiceps, C. & V.

(Roman).

Chrysophrys cristiceps, *Cuv. & Val.* vi. p. 132. Cape.
Chrysophrys cristiceps (C. & V. ?), *Pappe, Synops.* p. 13. Roman. Common in waters East of Table Bay.
Chrysophrys cristiceps, *Cast. Mem.* p. 22. Roman fish. Chiefly in Simon's Bay, near Roman Rock. One or two individuals only observed in Table Bay.
Chrysophrys cristiceps, *Blkr. Vische v.d. Kaap.* p. 62. Roman.
Chrysophrys cristiceps (C.V. ?), *Gunth.* i. p. 486. Cape Seas.

Chrysophrys gibbiceps, C. & V.

(Red Stumpnose).

Chrysophrys gibbiceps, *Cuv. & Val.* vi. p. 127, pl. 147. Cape.
Chrysoblephus gibbiceps, *Swains. Nat. Hist. Fishes.* pp. 171, 221.
Chrysoblephus gibbiceps, *Pappe, Synops.* p. 14. Baaische Roode Stompneus; Poeskop. Rare in Table Bay, but frequently caught with the hook in False Bay.
Chrysophrys gibbiceps, *Cast. Mem.* p. 20. Roode Stump Nose. Not found in Table Bay, but very abundant in Simon's Bay in summer.
? Chrysophrys nasutus, *Cast. Mem.* p. 24. Biscop. One specimen from Table Bay.
Chrysophrys gibbiceps, *Blkr. Vische v.d. Kaap.* p. 62.
Chrysophrys gibbiceps (C.V. ?), *Kner, Novara.* p. 86. Cape.
Chrysophrys gibbiceps, *Gunth.* i. p. 486. Cape of Good Hope.

Chrysophrys laniarius, Cast. (non C. & V.)

(Dageraad).

? Pagrus laniarius, *Pappe, Synops.* p. 14. Dageraad. Not found in Table Bay, but frequently caught with the hook in the waters towards the East and South of Cape Town.
Chrysophrys laniarius, *Cast. Mem.* p. 21. Dageraad. Algoa Bay, Simon's Bay, and Kalk Bay.

Chrysophrys natalensis, Cast.

Chrysophrys natalensis, *Cast. Mem.* p. 25. Natal.

Chrysophrys algoensis, Cast.

Chrysophrys algœnsis, *Cast. Mem.* p. 22. Algoa Bay.

Chrysophrys holubi, Studeh.

Pagrus (Chrysophrys) holubi, *Studchnr. Ich. Beitr.* x. p. 25, pl. ii. Algoa Bay.

Sargus cervinus, Lowe.
(Wilde-paard).

Charax cervinus, *Lowe, Trans. Zool. Soc.* ii. p. 177. (Fishes of Madeira).
Sargus fasciatus, *Valenc. Hist. Nat. Canar.* pl. 9. fig. 2.
Sargus hottentottus, *Smith, Illustr. Zool. S. Afr.* pl. 23. f. 1. S.E. coast of S. Africa, and frequently found in some of the large rivers.
Sargus hottentottus, *Pappe, Synops.* p. 12. Hangberger. Common to Table Bay from June to August.
Sargus hottentottus, *Cast. Mem.* p. 17. Hangberger. In Table Bay from June to August.
Sargus cervinus, *Gunth.* i. p. 448. Cape Seas. (Type of S. hottentottus).
Sargus hottentottus, *Kner, Novara.* p. 78. Cape.

Sargus capensis, Smith.
(Bastard Hottentot).

Sargus capensis, *Smith, Illustr. Zool. S. Afr.* pl. 23. fig. 2.
Sargus capensis, *Pappe, Synops.* p. 12. Hottentot fish. Mostly confined to Table Bay and the W. Coast, where it is found abundantly.
Sargus capensis, *Cast. Mem.* p. 17. Hottentot fish.
Sargus capensis, *Blkr. Vische v.d. Kaap,* p. 52.
Sargus capensis, *Gunth.* i. p. 442. Cape Seas. (Type).

Sargus rondeletii, C. & V.
(Dasje).

Sargus rondeletii, *Cuv. & Val.* vi. p. 14. fig. 141.
Sargus rondeletii, *Cast. Mem.* p. 18. From the Cape to Algoa Bay. Gamtoos River in abundance.

Sargus durbanensis, Cast.

Sargus durbanensis, *Cast. Mem.* p. 18. Durban.

Sargus holubi, Stndch.

Sargus holubi, *Stndchnr. Ich. Beitr.* x. p. 30, taf. iii. Algoa Bay.

Pagrus laniarius, C. & V.
(Panga).

Pagrus laniarius, *Cuv. & Val.* vi. p. 163.
Pagellus afer, *Pappe, Synops.* p. 14. Roode Kaapsche Stompneus. Pretty common on the market.
Pagellus afer, *Cast. Mem.* p. 27. Rare in Table Bay.
Pagellus afer, *Blkr. Vische v.d. Kaap*, p. 52 (quoted).
Pagrus laniarius, *Gunth.* i. p. 467. Cape Seas.
Pagrus laniarius, *Kner, Novara*, p. 85.

Pagrus unicolor, Q. & G.

Chrysophrys unicolor, *Quoy & Gaim. Voy. Uran.* p. 299.
Pagrus unicolor, *Gunth.* i. p. 468. Cape of Good Hope.

Pagrus caffer, Cast.

Pagrus caffer, *Cast. Mem.* p. 30. Port Natal.

Pagrus laticeps, C. & V.
(Red Steenbras).

Chrysophrys laticeps, *Cuv. & Val.* vi. p. 122. Cape.
Chrysophrys laticeps, *Cuv. Regne. Anim.* pl. 34, fig. 2.
Chrysophrys laticeps, *Gunth.* i. p. 485. Cape Seas, False Bay.
Dentex rupestris, *Smith* (not *Gunther), Illustr. Zool. S. Afr.* pl. 14.
Dentex rupestris, *Pappe, Synops.* p. 15. Bastard Silver Fish. Seventy-four. Rare in Table Bay. Chiefly confined to East Coast. (Description copied from Smith).
Dentex rupestris, *Blkr. Vische v.d. Kaap.* p. 59. Roode Steen Brass, Bastard Silver Fish, Seventy-four (quoted).
Chrysophrys laticeps, *Pappe, Synops.* p. 13. Roode Steenbrasem. Not very common in Table Bay. Abundant in False Bay.
Pagrus (pagrus) laticeps, *Stndchnr. Ich. Beitr.* x. p. 27.

Pagellus lithognathus, C. & V.
(Steenbras).

Pagellus lithognathus, *Cuv. & Val.* vi. p. 204, pl. 151. Cape of Good Hope.
Lithognathus capensis, *Swainson, Nat. Hist. Fishes,* ii. p. 222.
Lithognathus capensis, *Pappe, Synops.* p. 14. Blaauwe Kaapsche Steenbrasem. Caught with baited hooks during the summer, especially in Hout Bay.
Pagellus lithognathus, *Cast. Mem.* p. 26. Steenbrasem. Taken with the hook, especially at Simon's Bay. Procured from Algoa Bay and Port Natal.
Pagellus lithognathus, *Blkr. Visch. v.d. Kaap.* p. 52.
Pagellus lithognathus, *Gunth.* i. p. 483. Cape Seas.

Pagellus erythrinus, Linn.

Sparus erythrinus, *Linn. Syst.* i. p. 469.
Pagellus erythrinus, *Cuv. & Val.* vi. p. 170, pl, 150.
Pagellus erythrinus, *Parn. Fishes of Firth of Forth,* p. 43, pl, 27.
Pagellus canariensis, *Valenc. Hist. Nat. Canar.* p. 35, pl. 10, f. 2.
Pagellus erythrinus, *Gunth.* i. pp. 473-475. A single specimen from the Cape, but having 10 anal rays, and may, therefore, be a new species.

Pagellus mormyrus, Linn.
(Zee Basje).

Sparus mormyrus, *Linn. Syst. Nat.* p. 472.
Pagrus mormyrus, *Geoffr. Descr. Eg. Poiss.* pl. 18, f. 3.
Pagellus mormyrus, *Gunth.* i. p. 481. Cape of Good Hope?

Pagellus armatus, Cast.

Pagellus armatus, *Cast. Mem.* p. 27. Seen only once in the Cape market, July, 1856.

Pagellus fascialis, Cast.

Pagellus fascialis, *Cast. Mem.* p. 28. Algoa Bay.

Box salpa, Linn.
(Bamboo Fish).

Sparus salpa, *Linn. Syst. Nat.* i. p. 470.
Box salpa, *Cuv. & Val.* vi. p. 357, pl. 162.
Boops salpa, *Pappe, Synops.* p. 16. Bamboesvisch. Stinkvisch. Scarce in Cape Town market, but common in Saldanha Bay.
Boops salpa, *Cast. Mem.* p. 31. Bamboesvisch. Table Bay, Simon's Bay and Algoa Bay.
Box salpa, *Gunth.* i. p. 420. Cape Seas.

Pachymetopon grande, Gunth.

Pachymetopon grande, *Gunth.* i. p. 424. Hab. ?
Pachymetopon grande, *Gunth. Fishes,* p. 406 (1880). Cape of Good Hope.

Dipterodon capensis, C. & V.
(Galjoen).

Dipterodon capensis, *Cuv. & Val.* vii. p. 276, pl. 188. Cape of Good Hope.
Dipterodon capensis, *Cuv. Regne. An.* pl. 43, fig. 2.
Dipterodon capensis, *Pappe, Synops.* p. 16. Galjoenvisch, Galleonvisch. More plentiful in the Western Division of the Colony.
Dipterodon capensis, *Cast. Mem.* p. 34. Galleon fish. Appears to abound chiefly on West Coast, and is caught in Table Bay during the winter.
Dipterodon capensis, *Blkr. Vische v.d. Kaap.* p. 63.
Dipterodon capensis, *Gunth.* i. p. 426. Cape Seas.

Gymnocrotaphus curvidens, Gunth.
(John Brown).

Gymnocrotaphus curvidens, *Gunth.* i. p. 432. Cape Seas.

Pimelepterus fuscus, C. & V.

Pimelepterus fuscus, *Cuv. & Val.* vii. p. 264. Cape of Good Hope.
Pimelepterus fuscus, *Rupp. N.W. Fische.* p. 34. taf. 10. f. 3.
Pimelepterus fuscus, *Pappe, Synops.* p. 16. Bastard Jacob Evertsen. Caught chiefly in Simon's Bay and along the East Coast.

Pimelepterus fuscus, *Cast. Mem.* p. 34. Jacob Piver. East Coast, chiefly Simon's Bay.
Pimelepterus fuscus, *Blkr. Vische v.d. Kaap*, p. 53.

Charax capensis, Cast.

Charax capensis, *Cast. Mem.* p. 19. Cape of Good Hope.

Boopsoidea inornata, Cast.

Boopsoidea inornata, *Cast. Mem.* p. 26. French Madam. Algoa Bay.

Crenidens forskalii, C, & V.

Crenidens forskalii, *Cuv. & Val.* vi. p. 377, pl. 162 quater.
Crenidens forskalii, *Gunth.* i. p. 424. Mozambique.
Crenidens forskalii, *Cast. Mem.* p. 424. Natal.

Pagrichthys castelnaui, Blkr.

Pagrichthys castelnaui, *Blkr. Vische v.d. Kaap.* p. 61.

Fam.: **CIRRHITIDAE.**

Chilodactylus fasciatus, Lacep.
(Steenklipvisch).

Chilodactylus fasciatus, *Lacep.* v. p. 6, pl. i. fig. 1.
Chilodactylus fasciatus, *Cuv. & Val.* v. p. 357. Cape.
Chilodactylus fasciatus, *Pappe, Synops.* p. 11. Steenvisch. Not very abundant in Table Bay.
Chilodactylus fasciatus, *Cast. Mem.* p. 11. Steenvisch. Very common in Cape market during winter.
Chilodactylus fasciatus, *Blkr. Vische v.d. Kaap.* p. 63.
Chilodactylus fasciatus, *Gunth.* ii. p. 81. Cape of Good Hope.

Chilodactylus brachydactylus, C. & V.

Chilodactylus brachydactylus, *Cuv. & Val.* v. p. 361. Cape.
Chilodactylus brachydactylus, *Pappe, Synops.* p. 12. Steenklipvisch. Pompelmoesje. Among rocks at Green Point.

Chilodactylus brachydactylus, *Cast. Mem.* p. 11. Steenklipvisch, Pompelmoesjes. Very rare, and said to be found only at Green Point among rocks.
Chilodactylus brachydactylus, *Gunth.* ii. p. 81. Cape of Good Hope.
Chilodactylus brachydactylus, *Blkr. Vische v.d. Kaap.* p. 52.

Chilodactylus grandis, Gunth.

Chilodactylus grandis, *Gunth.* ii. p. 79. Cape Seas.

Cheilodactylus multiradiatus, Cast.

Cheilodactylus multiradiatus, *Cast. Mem.* p. 12. Cape Colony.

Cirrhites forsteri, Bl.

Grammistes forsteri, *Bl. Schn.* p. 191.
Sparus pantherinus, *Lacep.* iv. p. 160, pl. 6. fig. 1.
Cirrhites pantherinus, *Less. Voy. Coq. Poiss.* p. 225, pl. 22. fig. 1.
Cirrhites forsteri, *Gunth.* ii. p. 71. Cape Seas.
Cirrhites forsteri, *Day, Fishes of India,* p. 144, pl. xxxv. fig. 4.

Cirrhites arcatus, C. & V.

Cirrhites arcatus, *Cuv. & Val.* iii. p. 74.
Cirrhites arcatus, *Cuv. Regne. Anim. Ill. Poiss.* pl. 10. fig. 2.
Cirrhites arcatus, *Richard. Voy. Samar. Fishes.* p. 26, pl. 5. fig. 3-5.
Cirrhites arcatus, *Blkr. Vische v.d. Kaap.* p. 52.

Fam.: **TRIGLIDÆ.**

Sebastes capensis, C. & V.
(Jacopiver).

Gronov. Zoophyl, No. 293. p. 88. Cape.
Scorpæna capensis, *L. Gmel. Syst. Nat.* iii. p. 1219. Cape.
Sebastes capensis, *Cuv. & Val.* iv. p. 341. Cape of Good Hope.
Sebastes capensis, *Quoy & Gaim. Astrol. Poiss.* p. 690, pl. 11. fig. 3.
Sebastes capensis, *Smith, Illustr. Zool. S. Afr.* pl. 22. fig. 1.

? Sebastes maculatus, *Smith, Illustr. Zool. S. Afr.* pl. 22. fig. 2.
Sebastes capensis, *Pappe, Synops.* p. 10. Jacob Evertsen. Common in Table Bay almost at all seasons.
Sebastes capensis, *Cast. Mem.* p. 6. Jacob Evertsen, Jacob Piver. Very common in the Cape market. Smith in his illustration has confounded the 2 species.
Sebastes capensis, *Gunth.* ii. p. 96. Cape Seas.
Sebastes capensis, *Studchnr. Ich. Beitr.* x. p. 39. (S. maculatus, Smith). Cape Town and Port Elizabeth.
Sebastichthys capensis, *Sauvage, Madagascar Fishes.* p. 289.

Sebastes maculatus, C. & V.
(Sancord).

Sebastes maculatus, *Cuv. & Val.* iv. p. 343. Cape.
Sebastes maculatus, *Pappe, Synops.* p. 10. Sancord. Not very common. Chiefly caught in winter.
Sebastes maculatus, *Cast. Mem.* p. 7. Common in the market, especially during the winter (June, July, and August).
Sebastes maculatus, *Gunth.* ii. p. 101. Cape Seas (quoted).

Pterois volitans, Linn.

Gasterosteus volitans, *Linn.* i. p. 491.
Pterois volitans, *Cuv. & Val.* iv. p. 352. pl. 88.
Pterois volitans, *Gunth.* ii. p. 122. Cape of Good Hope.

Agriopus torvus, Gronov.
(Paarde-visch).

Blennius torvus, *Gronov. Act. Basil.* vii. p. 47. tab. 3. f. 2.
Agriopus torvus, *Cuv. & Val.* iv. p. 382. See-paard. Cape of Good Hope.
Agriopus torvus, *Cast. Mem.* p. 7. Paardevisch. Cape.
Agriopus torvus, *Gunth.* ii. p. 137. Cape Seas.

Agriopus verrucosus, C. & V.

Agriopus verrucosus, *Cuv. & Val.* iv. p. 387, pl. 91. Cape.
Agriopus verrucosus, *Blkr. Vische v.d. Kaap.* p. 53.
Agriopus verrucosus, *Gunth.* ii. p. 138. Cape of Good Hope.

Agriopus spinifer, Smith.

Agriopus spinifer, *Smith, Illustr. Zool. S. Afr.* pl. 3. Specimens occasionally caught in Table Bay, but by no means so frequently as either A. torvus or A. verrucosus.

Agriopus multidentatus, Cast.

Agriopus multidentatus, *Cast. Mem.* p. 7.

Platycephalus insidiator, Forsk.

Cottus insidiator, *Forsk.* p. 25.
Platycephalus insidiator, *Faun. Jap. Poiss.* p. 39, pl. 15. fig. 1.
Platycephalus insidiator, *Gunth.* ii. p. 177. Cape of Good Hope.

Prionotus pusillus, Cast.

Prionotus pusillus, *Cast. Mem.* p. 6. Table Bay during summer.

Trigla kumu, Less.

Trigla kumu, *Less. & Garn. Coqu. Poiss.* pl. 19.
Trigla kumu, *Fauna. Jap. Poiss.* p. 37, pl. 14A.
Trigla kumu, *Blkr. Vische v.d. Kaap.* p. 53.
Trigla kumu, *Kner, Novara.* p. 124. taf. vi. fig. 2. Cape.

Trigla peronii, C. & V.

(Knorhaan).

Trigla peronii, *Cuv. & Val.* iv. p. 53. Cape.
Trigla peronii, *Pappe, Synops.* p. 9. Graauwe or bruine Knorhaan; Grey Gurnard. Not often caught in Table Bay.
Trigla capensis, *Cast. Mem.* p. 5. Graauwe Knorhaan, Grey Gurnard (= the female form, the Red Gurnard being the male). Common in the months of July, August, and September.
Trigla peronii, *Blkr. Vische v.d. Kaap.* p. 64. Grey Gurnard, Graauwe or bruine Knorhaan.

Trigla capensis, C. & V.

(Knorhaan).

Trigla capensis, *Cuv. & Val.* iv. p. 55. Cape.
Trigla capensis, *Pappe, Synops.* p. 9. Roode Knorhaan, Red Gurnard. Caught in summer with the hook, but not very common in Table Bay.

Trigla capensis, *Cast. Mem.* p. 5. Roode Knorhaan (the female), Graauwe Knorhaan (the male). Common in July, August, and September.
Trigla capensis, *Gunth.* ii. p. 203. Cape Seas.
Trigla capensis, *Kner, Novara.* p. 124.

Trachinus draco, Linn.

Trachinus draco, *Linn. Syst. Nat.* i. p. 435.
Trachinus draco, *Gunth.* ii. p. 233. Cape Seas.
Trachinus draco, *Smitt, Scandinavian Fishes,* pl. 4. fig. 3.

Fam.: **HOPLEGNATHIDAE.**

Hoplegnathus conwayi, Richards.
(Papegaai-visch).

Hoplegnathus conwayi, *Richards. Trans. Zool. Soc.* iii. p. 144, pl. 7. f. 1.
Ichthyoramphus pappei, *Cast. Mem.* p. 35. From Kalk Bay.

Fam.: **BERYCIDAE.**

Holocentrum sammara, Forsk.

Sciæna sammara, *Forsk.* p. 48.
Holocentrum sammara, *Gunth.* i. p. 46. Cape Seas.
Labrus angulosus, *Lacep.* iii. pl. 22. fig. 1.

Fam.: **SCIAENIDAE.**

Umbrina cirrhosa, Linn.

Sciæna cirrhosa, *Linn. Syst. Nat.* i. p. 481.
Umbrina cirrhosa, *Cuv. Regne. Anim. Poiss.* pl. 25. fig. 3.
Umbrina cirrhosa, *Gunth.* ii. p. 274. Algoa Bay.

Umbrina capensis, Pappe.

(Baardmann).

Umbrina capensis, *Pappe, Synops.* p. 11. **Baardmannetje.** Chiefly caught in False Bay during summer.
Umbrina capensis, *Cast. Mem.* p. 10. Baardmannetje. **Very** rare. Simon's Bay during summer.

Sciaena aquila, Risso.

(Kabeljaauw).

Sciæna aquila, *Risso, Ichth. Nice, edit.* i. p. 298, pl. 9. f. 30.
Sciæna aquila, *Cuv. Regne. Anim.* pl. 27. f. 1.
Sciæna hololepidotus, *Cuv. & Val.* v. p. 53. Cape of Good Hope.
Sciæna hololepidotus, *Quoy & Gaim. Voy. Astrol. Poiss.* p. 697, pl. 12. f. 1. Cape.
Sciæna hololepidotus, *Smith, Illustr. Zool. S. Africa,* pl. 15. A staple fish of Cape Town market.
Sciæna hololepidota, *Pappe, Synops.* p. 11. Kabeljaauw. Common on the coast and at mouth of rivers.
Sciæna hololepidota, *Cast. Mem.* p. 9. Kabeljaauw. **Very abundant.** Adults appear in winter, and young are common in summer (January-February).
Sciæna aquila, *Blkr. Vische v.d. Kaap.* p. 64.
Sciæna aquila, *Gunth.* ii. p. 291. Algoa Bay.

Otolithus aequidens, C. & V.

(Geelbeck. Cape Salmon).

Otolithus aequidens, *Cuv. & Val.* v. p. 66. Cape.
Otolithus aequidens, *Smith, Illustr. Zool. S. Africa,* pl. 13. Keel Bek. Abundant in seas round southern point of Africa, and is often caught in numbers in Table Bay.
Otolithus aequidens, *Pappe, Synops.* p. 11. Geelbeck. Common along the whole coast.
Otolithus acquidens, *Cast. Mem.* p. 10. Geelbeck. Cape Salmon. In abundance, especially in Simon's Bay during the summer (January, February, and March).

Corvina punctata, Cast.

Corvina punctata, *Cast. Mem.* p. 9. Port Natal.

Fam.: **XIPHIIDAE.**

Xiphias gladius, Linn.

Xiphias gladius, *Linn. Syst.* i. p. 432.
Xiphias gladius, *Cuv. & Val.* viii. p. 255, pl. 225, 226. La cote d'Afrique jusqu'an Cap. M. Quoy et Gaimard en ont dessine un an cabinet de la ville du cap.
Xiphias gladius, *Cast. Mem.* p. 42. Occurs, though rare, in Cape Seas (quoted?)
Xiphias gladius, *Blkr. Vische v.d. Kaap.* p. 53 (quoted).

Histiophorus gladius, Brouss.

Scomber gladius, *Brouss. Mem. Acad. Sc.* 1786. p. 454, pl. 10.
Histiophorus indicus, *Cuv. & Val.* viii. p. 293, pl. 229.
Histiophorus gladius, *Gunth.* ii. p. 513. Cape of Good Hope.

Histiophorus granulifer, Cast.

Histiophorus granulifer, *Cast. Mem.* p. 42. Described from a mutilated skeleton in Cape Town Museum, found after a violent storm at St. Sebastian Bay.

Histiophorus herschelii, Gray.

Tetrapturus herschelii, *Gray, Ann. Nat. Hist.* i. p. 313, pl. 10.
Histiophorus herschelii, *Gunth.* ii. p. 513. Table Bay. (Type of species).

Fam.: **SPHYRAENIDAE.**

Sphyraena jello, C. & V.

Sphyræna jello, *Cuv. & Val.* iii. p. 349.
Sphyræna jello, *Belanger, Voy. Zool.* p. 346, pl. 1. f. 1. ("Not good," Gunther).
Sphyræna jello, *Gunth.* ii. p. 337. Cape Seas.

Sphyraena vulgaris, C. & V.

Sphyræna vulgaris, *Cuv. & Val.* iii. p. 327. Cuv. Regne. An. pl. 18. f. 1.
Sphyræna vulgaris, *Blkr. Vische v.d. Kaap.* p. 53. (Name only. Quoted from ?)

Sphyraena commersonii, Cast.

Sphyrene chinoise, *Lacep.* v. pl. 8. fig. 3.
Sphyræna commersonii, *Cuv. & Val.* iii. p. 352.
Sphyræna commersonii, *Cast. Mem.* p. 4. Port Natal.

Fam.: **TRICHIURIDAE.**

Thyrsites atun, Euphr.
(Snoek).

Scomber atun, *Euphrasen, Vetensk, Acad, Nya Handl. XII. Stockh.* 1791, p. 315. Cape.
Acinacee batarde, *Bory St. Vincent, Voy. aux iles d'Afrique.* t. 1, pl. 4. f. 2. Cape.
Thyrsites atun, *Cuv. & Val.* viii. p. 196, pl. 219. Snoek. Seas round the Cape of Good Hope. Very abundant in summer. Found on Agulhas Bank in winter.
Thyrsites atun, *Cuv. Regne. Anim. Ill. Poiss.* pl. 49. f. 1.
Thyrsites atun, *Pappe, Synops.* p. 17. Snook, Snoek. Caught in immense numbers almost all the year round.
Thyrsites atun, *Cast. Mem.* p. 42. Snoek. Very common in Table Bay. Appears about the middle of August, but is not abundant until September, and disappears towards the end of June.

Lepidopus caudatus, Euphr.
(Kalk-visch).

Trichiurus caudatus, *Euphrasen, Stockh. K. Vet. Acad. Nya Handl.* 1788, ix. p. 52. tab. 9. f. 2.
Lepidopus argyreus, *Cuv. & Val.* viii. p. 223, pl. 223.
Lepidopus argyreus, *Pappe, Synops.* p. 18. Kalkvisch. Scabbard-fish. Table Bay. Very rare.
Lepidopus caudatus, *Cast. Mem.* p. 43. Lyre. fish. Cape. Very rare.
Lepidopus argyreus, *Blkr. Vische v.d. Kaap.* p. 53.
Lepidopus caudatus, *Gunth.* ii. p. 344. Cape Seas.

FAM.: **CARANGIDAE.**

Caranx trachurus, Lacep.

(Maasbanker).

Caranx trachurus, *Lacep.* iii. p. 63.
Caranx trachurus, *Cuv. & Val.* ix. p. 11, pl. 246. Cape.
Caranx trachurus, *Pappe, Synops.* p. 18. Maasbanker, Bastard Mackerel. Caught in winter at both ends of the Colony.
Trachurus capensis, *Cast. Mem.* p. 43. Bastard Mackerel, Maasbanker.
Selar trachurus, *Blkr. Vische v.d. Kaap.* pp. 53, 67.
Trachurus trachurus, *Gunth.* ii. p. 419. Cape of Good Hope.

Caranx hippos, Linn.

Scomber hippos, *Linn. Syst. Nat.* i. p. 494. (Not Mitchell)
Caranx flavo-cæruleus, *Schleg. Faun. Jap.* p. 110, pl. 59. f. 2.
Caranx paraspistes, *Richards. Ichth. Voy. Ereb. & Terr.* p. 136, pl. 58. f. 6, 7.
Caranx hippos, *Gunth.* ii. p. 449. Port Natal. (Specimen not in condition for certain identification).

Seriola lalandii, C. & V.

(Albacore, Geelstaart).

Seriola lalandii, *Cuv. & Val.* ix. p. 208.
Scomber capensis, *Cuv. & Val.* viii. p. 41. Cape. (Skeleton only).
Scomber capensis, *Pappe, Synops.* p. 16. Halfcord. Rather uncommon in Table Bay.
Lichia pappei, *Cast. Mem.* p. 40. Halfcord. In great numbers during the summer at Kalk Bay.
Seriola capensis, *Blkr. Vische v.d. Kaap.* pp. 53, 65. Halfcord.
Seriola aureo-vittata, *Faun. Jap.* pl. 62. ("Not good," Gunth.).
Seriola lalandii, *Gunth.* ii. p. 463. Cape Seas.

Porthmeus argenteus, C. & V.

Porthmeus argenteus, *Cuv. & Val.* ix. p. 256, pl. 264. Cape of Good Hope.
Porthmeus argenteus, *Gunth.* ii. p. 471 (quoted).

Lichia amia, Linn.
(Leer-visch).

Scomber amia, *Linn. Syst. Nat.* i. p. 495.
Lichia amia, *Cuv. Regne. Anim. Ill. Poiss.* pl. 54. f. 3.
Lichia amia, *Pappe, Synops.* p. 17. Leervisch. Taken occasionally in Table Bay.
Lichia amia, *Cast. Mem.* p. 39. Leervisch and leaterfish. Does not appear to occur east of the Agulhas Bank.
Lichia amia, *Gunth.* ii. p. 476. Cape Seas. Algoa Bay.

Lichia glauca, Linn.

Scomber glaucus, *Linn. Syst. Nat.* i. p. 494.
Lichia glaucus, *Cuv. & Val.* viii. p. 358, pl. 234. Cape.
Lichia glaucus, *Webb & Berthel. Iles. Canar.* p. 56, pl. 13. f. 1.
Lichia glaycos, *Cast. Mem.* p. 39. Very rare in Cape Seas. Algoa Bay.
Lichia glauca, *Gunth.* ii. p. 477. Cape Seas.

Temnodon saltator, Linn.
(Elft).

Gasterosteus saltatrix, *Linn. Syst. Nat.* i. p. 491.
Temnodon saltator, *Cuv. & Val.* ix. p. 225, pl. 260. Cape.
Temnodon saltator, *Cuv. Regne. Anim. Ill. Poiss.* pl. 56. f. 3.
Temnodon saltator, *Webb & Berthel. Iles. Canar.* p. 58, pl. 26. f. 2 (pl. 13?).
Temnodon saltator, *Pappe, Synops.* p. 17. Elftvisch. Often caught in Table Bay, particularly in summer.
Temnodon saltator, *Cast. Mem.* p. 41. Elftvisch. Very common at the Cape, and reported from Natal.

Temnodon conidens, Cast.

Temnodon conidens, *Cast. Mem.* p. 41. One only seen, and that from Algoa Bay.

Psettus argenteus, Linn.

Chætodon argenteus, *Linn. Amoen. Acad.* iv. p. 249.
Psettus argenteus, *Cuv. Regne. Anim. Ill. Poiss.* pl. 42. f. 2.
Psettus argenteus, *Richards. Voy. Ereb. & Terr. Fishes.* p. 57. pl. 35. f. 1-3.

Psettus argenteus, *Day, Fishes of India*, p. 234, pl. LI, B. fig. 5.
Psettus argenteus, *M. Web. Zool. Jahr.* Bd. x. 1897. p. 142. Cape Colony: lagoon at Knysna. Natal: Illovo River.

Psettus falciformis, Lacep.

Psettus falciformis, *Lacep.* iii. pp. 131, 132, 133.
Psettus falciformis, *Day, Fishes of India*, p. 142, pl. LI, A. fig. 6.
Psettus falciformis, *M. Web. Zool. Jahr.* Bd. x. *Heft.* 2. p. 142 (1897). Natal: Illovo River several hours journey from the sea.

Fam.: **SCOMBRIDAE.**

Scomber scomber, Linn.

Scomber scombrus, *Linn. Syst.* i. p. 492.
Scomber scombrus, *Blkr. Vische v.d. Kaap.* p. 53 (quoted from?).

Scomber pneumatophorus, De la Roche.

(Makreel, Mackerel).

Scomber pneumatophorus, *De la Roche, Ann. Mus. Hist. Nat.* xiii. pp. 315, 334.
Scomber grex, *Cuv. & Val.* viii. p. 45. Cape.
? Scomber capensis, *Cuv. & Val.* viii. p. 56. Cape.
Scomber grex, *Pappe, Synops.* p. 17. Mackerel. Common in Table Bay during the winter.
Scomber grex, *Cast. Mem.* p. 38. Mackerel. Very common at Kalk Bay in summer.
Scomber pneumatophorus, *Gunth.* ii. p. 359. Cape Seas.

Thynnus pelamys, Linn.

(Katunker).

Scomber pelamys, *Linn. Syst. Nat.* i. p. 492.
Thynnus pelamys, *Cuv. & Val.* viii. p. 113, pl. 214. Coast of Africa.
Thynnus pelamys, *Blkr. Vische v.d. Kaap.* p. 53.
Thynnus pelamys, *Gunth.* ii. p. 364. Cape Seas.

Thynnus alalonga, Risso.

Thynnus alalonga, *Risso, Eur, Merid.* iii. p. 419.
Thynnus alalonga, *Cuv. & Val.* viii. p. 120, pl. 215.
Thynnus alalonga, *Gunth.* ii. p. 366. Cape of Good Hope.

Pelamys sarda, Bl.

Scomber sarda, *Bloch*, x. p. 35. taf. 334.
Pelamys sarda, *Gunth.* ii. p. 367. Cape of Good Hope.

Cybium commersonii, Lacep.

Scomber commersonii, *Lacep.* ii. p. 600, pl. 20. f. 1.
Cybium commersonii, *Gunth.* ii. p. 370.

Cybium flavo-brunneum, Smith.

Cybium flavo-brunneum, *Smith, Illustr. Zool. S. Afr.* pl. 20. Now and then caught in the seas about the Cape of Good Hope.
Cybium flavo-brunneum, *Gunth.* ii. p. 373. Cape of Good Hope (type of species).

Naucrates ductor, Linn.

Gasterosteus ductor, *Linn. Syst. Nat.* 1. p. 489.
Naucrates ductor, *Cuv. & Val.* viii. p. 312, pl. 232.
Naucrates indicus, *Cuv. Regne. Anim. Ill. Poiss.* p. 54. f. 1.
? Nauclerus annularis, *Cuv. & Val.* ix. p. 254. Between St. Helena and the Cape.
? Nauclerus leucurus, *Cuv. & Val.* ix. p. 255. Between St. Helena and the Cape.
Naucrates ductor, *Gunth.* ii. p. 374. Cape Seas. Specimen not in good state.
Naucrates ductor, *Day, Fishes of India,* p. 229, pl. LI, A. fig. 2. Seas of temperate tropical regions.

Echeneis remora, Linn.

(Lootsmann, Sucker-fish).

Echeneis remora, *Linn. Syst.* i. p. 446.
Echeneis remora, *Gunth.* ii. p. 378. Cape of Good Hope.

Echeneis clypeata, Gunth.

Echeneis clypeata, *Gunth. Ann. & Mag. Nat. Hist. May,* 1860. p. 401. Cape Seas.

Cubiceps capensis, Smith.

Atimostoma capense, *Smith, Illustr. Zool. S. Africa,* p. 24. Only one imperfect speciment found on beach to northwards of Cape Town after a heavy gale of wind.
Atimostoma capense, *Blkr. Vische v.d. Kaap.* p. 53.
Cubiceps capensis, *Gunth.* ii. p. 389. (Type of species).

Zeus capensis, C. & V.

Zeus capensis, *Cuv. & Val.* x. p. 23. Cape.
Zeus capensis, *Gunth.* ii. p. 394. Cape Seas.

Stromateus capensis, Pappe.

Stromateus capensis, *Pappe, Synops.* p. 18. Katunker. Chiefly east of Table Bay; not common.
Stromateus capensis, *Blkr. Vische v.d. Kaap.* p. 53.

Stromatoidea layardi, Cast.

Stromatoidea layardi, *Cast. Mem.* p. 44. Algoa Bay. Natal.

Coryphaena hippurus, Linn.

Coryphæna hippurus, *Linn. Syst.* p. 446.
Coryphæna hippurus, *Cuv. & Val.* ix. p. 278, pl. 266.
Coryphæna hippurus, *Gunth.* ii. p. 405. Cape Seas.

Coryphaena fasciolata, C. & V.

Lampugus fasciolatus, *Cuv. & Val.* ix. p. 328.
Coryphæna fasciolata, *Pall. Spicil. Zool. fasc.* 8. *taf.* 3. *fig.* 2.
Coryphæna fasciolata, *Blkr. Vische v.d. Kaap.* pp. 54, 66.

Brama raii, Bl.

Brama raii, *Bl. Schn.* p. 99.
Brama raii, *Gunth.* ii. p. 408. Cape Seas.
Brama raii, *Smitt, Scandinavian Fishes.* p. 77, pl. vi. f. 1.

Fam.: BATRACHIDAE.

Batrachus apiatus, C. & V.

Batrachus apiatus, *Cuv. & Val.* xii. p. 477. Cape.
Batrachus apiatus, *Cuv. Regne. Ill. Poiss.* pl. 85. fig. 3.
Batrachus apiatus, *Gunth.* iii. p. 559. Cape Seas.
Batrachus apiatus, *Blkr. Vische v.d. Kaap.* p. 55.

Fam.: PEDICULATI.

Lophius piscatorius, Linn.

(Padda, Fishing Frog).

Lophius piscatorius, *Linn. Syst. Nat.* i. p. 402.
Lophius piscatorius, *Gunth.* iii. p. 179. Cape Seas.

Lophius upsicephalus, Smith.

Lophius upsicephalus, *Smith, Illustr. Zool. S. Africa*, pl. 9. Seas of Cape of Good Hope.
? Lophius cynocephalus, *Blkr. Vische v.d. Kaap.* p. 55. (Wrongly quoted as Smith's).
Lophius upsicephalus, *Gunth.* iii. p. 181. Cape.

Lophius vomerinus, C. & V.

Lophius vomerinus, *Cuv. & Val.* xii. p. 381. Cape of Good Hope.
Lophius vomerinus, *Blkr. Vische v.d. Kaap.* p. 55.
Lophius vomerinus, *Gunth.* iii. p. 181. Cape.

Antennarius marmoratus, Gunth.

Antennarius marmoratus, var. ranina, *Gunth.* iii. p. 185.
Antennarius lævigatus, *Blkr. Vische v.d. Kaap.* pp. 55, 76

Fam.: GOBIIDAE.

Gobius nudiceps, C. & V.

(Dik-kop).

Gobius nudiceps, *Cuv. & Val.* xii. p. 65. Cape.
Gobius nudiceps, *Cast. Mem.* p. 55. Dik-kop. Among the rocks in July and August.
? Gobius nudiceps, *Blkr. Vische v.d. Kaap.* pp. 55, 75. Cape Peninsula.
Gobius nudiceps, *Gunth.* iii. p. 13. Cape of Good Hope (quoted).
? Gobius nudiceps, *Kner, Novara.* p. 177. Cape of Good Hope.

Gobius giuris, Buch.

Gobius giuris, *Buchanan Hamilton, An Account of Fishes found in the River Ganges,* p. 51, pl. 33. fig. 15. 1882.
Gobius giuris, *M. Web. Zool. Jahr.* Bd. x. *Heft.* 2. p. 144. Natal. Mouth of Umhloti River; Umbilo River; fresh water pool at Isipingo.
Gobius giuris, *Day, Fishes of India,* p. 295, pl. lxiii. f. 7 ("=G. spectabilis of Gunth.").

Gobius dewaali, M. Web.

Gobius dewaali, *M. Web. Zool. Jahr.* Bd. x. *Heft.* 2. p. 145. Natal. Umgeni and Illovo Rivers, far inland.

Gobius gilchristi, Blgr.

Gobius gilchristi, *Blgr. Mar. Inv. S. Africa,* i. p. 8. Little Brak River, Mossel Bay.

Gobius spectabilis, Gunth.

Gobius spectabilis, *Gunth.* iii. p. 45.
Gobius spectabilis, *M. Web. Zool. Jahr.* Bd. x. *Heft.* 2. p. 144. Natal: Umgeni River; Umhloti River, near Verulam; Illovo River.
? Gobius giuris, *Day, Fishes of India,* p. 295, pl. lxiii. fig. 7.

Gobius olivaceus, Cast.

Gobius olivaceus, *Cast. Mem.* p. 55.

Gobius capensis, Cast.

Gobius capensis, *Cast. Mem.* p. 55. Among the rocks with G. nudiceps.

Gobius gymnauchen, M. Web.

Gobius gymnauchen, *M. Web. Zool. Jahr.* Bd. x. *Heft.* 2. p. 144. Natal: Illovo River. Knysna

? Gobius nudiceps, *Blkr. Vische v.d. Kaap.* pp. 55, 57.

Gobius platynotus, Gunth.

Gobius platynotus, *Gunth.* iii. p. 66. Cape?

Callionymus costatus, Blgr.

Callionymus costatus, *Blgr. Mar. Inv. S. Africa*, i. p. 9. Eleven miles off Cape St. Blaize, 40 fms.

Fam.: **BLENNIIDAE.**

Clinus superciliosus, Linn.

(Klip-visch).

Blennius superciliosus, *Linn, Syst.* i. p. 442.

Blennius capensis, *Forst. Descr. An.* p. 408. Cape.

Clinus superciliosus, *Cuv. & Val.* xi. p. 360, pl. 331. Cape of Good Hope. Abundant.

Blennius versicolor, *Pappe, Synops.* p. 19. Klipvisch.

Blennius versicolor, *Blkr. Vische v.d. Kaap.* p. 55.

? Blennius rubescens, *Lichtenst. Travels.*

Clinus superciliosus, *Cast. Mem.* p. 51. Very common in Table Bay all the year round.

Clinus superciliosus, *Gunth.* iii. p. 268. Cape of Good Hope.

Clinus superciliosus, *Blkr. Vische v.d. Kaap.* pp. 55, 70.

Clinus superciliosus, *Kner, Novara.* p. 200. Cape of Good Hope.

Clinus heterodon, C. & V.

Clinus heterodon, *Cuv. & Val.* xi. p. 394. Cape.

Clinus heterodon, *Gunth.* iii. p. 270 (quoted).

Clinus cottoides, C. & V.

Clinus cottoides, *Cuv. & Val.* xi. p. 367. Cape.
Clinus cottoides, *Gunth.* iii. p. 269. Cape.
Clinus cottoides, *Kner, Novara.* p. 202. Cape of Good Hope.

Clinus capensis, C. & V.

Cirrhibarbis capensis, *Cuv. & Val.* xi. p. 406, pl. 337. Cape.
Cirrhibarbis capensis, *Blkr. Vische v.d. Kaap.* p. 55.
Clinus capensis, *Gunth.* iii. p. 269.

Clinus acuminatus, C. & V.

Clinus acuminatus, *Cuv. & Val.* xi. p. 370. Cape. Abundant.
Clinus acuminatus, *Gunth.* iii. p. 269. Cape Seas.
Clinus acuminatus, *Kner, Novara.* p. 202. Cape Town.

Clinus latipinnis, C. & V.

Clinus latipinnis, *Cuv. & Val.* xi. p. 394. Cape.
Clinus latipinnis, *Gunth.* iii. p. 267 (quoted).

Clinus brachycephalus, C. & V.

Clinus brachycephalus, *Cuv. & Val.* xi. p. 371. Cape.
Clinus brachycephalus, *Gunth.* iii. p. 264 (quoted).

Clinus dorsalis, Cast.

Clinus dorsalis, *Cast. Mem.* p. 54. Found in Table Bay among the rocks during June and July.
Clinus dorsalis, *Blkr. Vische v.d. Kaap.* pp. 55, 72.
Clinus dorsalis, *Gunth.* iii. p. 271 (quoted).

Clinus anguillaris, C. & V.

(Slangetje).

Clinus anguillaris, *Cuv. & Val.* xi. p. 390, pl. 334. Cape.
Clinus anguillaris, *Cast. Mem.* p. 53.
Clinus anguillaris, *Blkr. Vische v.d. Kaap.* p. 55.
Clinus anguillaris, *Gunth.* iii. p. 271. Cape of Good Hope.

Clinus pantherinus, Cast.

Clinus pantherinus, *Cast. Mem.* p. 52. Only found once in Table Bay.

Clinus marmoratus, Cast.

Clinus marmoratus, *Cast. Mem.* p. 52. Table Bay.

Cristiceps argentatus, Risso.

Clinus argentatus, *Risso, Eur. Merid.* iii. p. 238.
Clinus dubius, *Cast. Mem.* p. 51. Very common in Table Bay.
Clinus dubius, *Blkr. Vische v.d. Kaap.* pp. 54, 71.
Clinus argentatus, *Gunth.* iii. p. 272. Cape of Good Hope.

Blennius cornutus, Linn.

Blennius cornutus, *Linn. Amoen. Acad.* i. p. 316.
Blennius grandicornis, *Cuv. & Val.* xi. p. 258. Cape of Good Hope.
Blennius grandicornis, *Cast. Mem.* p. 51 (quoted).
Blennius grandicornis, *Blkr. Vische v.d. Kaap.* p. 55 (quoted).
Blennius grandicornis, *Gunth.* iii. p. 213.

Blennius capito, C. & V.

Blennius capito, *Cuv. & Val.* xi. p. 260. Cape.
Blennius capito, *Cast. Mem.* p. 51.
Blennius capito, *Blkr. Vische v.d. Kaap.* p. 55.
Blennius capito, *Gunth.* iii. p. 215. Cape of Good Hope.

Blennius castaneus, Cast.

Blennius castaneus, *Cast. Mem.* p. 50. Algoa Bay.

Blennius crinitus, C. & V.

Blennius crinitus, *Cuv. & Val.* xi. p. 237.
Blennius crinitus, *Gunth.* iii. pp. 224, 561. Cape Seas.

Blennius bifilum, Gunth.

Blennius bifilum, *Gunth.* iii. p. 225. Cape Seas.

Salarias dussumieri, Gunth.

Salarias dussumieri, *Gunth.* iii. pp. 251, 562. Cape of Good Hope.

Fam.: **ATHERINIDAE.**

Atherina breviceps, C. & V.

(Spiering).

Atherina breviceps, *Cuv. & Val.* x. p. 445. Cape.
Atherina breviceps, *Cast. Mem.* p. 45. Asance. Abundant in August.
Atherina breviceps, *Blkr. Vische v.d. Kaap.* pp. 54, 68.
Atherina breviceps, *Gunth.* iii. p. 395. Cape of Good Hope.

Atherina parvipinnis, C. & V.

Atherina parvipinnis, *Cuv. & Val.* x. p. 446. Cape.
Atherina parvipinnis, *Cast. Mem.* p. 45 (quoted).
Atherina parvipinnis, *Blkr. Vische v.d. Kaap.* p. 54.
Atherina parvipinnis, *Gunth.* iii. p. 396 (quoted).

Fam.: **MUGILIDAE.**

Mugil capensis, C. & V.

(Harder).

Mugil capensis, *Cuv. & Val.* xi. p. 108. Cape.
Mugil capensis, *Smith, Illustr. Zool. S. Africa*, pl. 30. fig. 1. Seas of Eastern and Western Coasts, and also some of the rivers and lakes of the Colony.
Mugil euronotus, *Smith, Illustr. Zool. S. Africa*, pl. 29. fig. 2 and 2A.
Mugil capensis, *Pappe, Synops.* p. 19. Harder, Mullet.

Mugil smithii, *Cast. Mem.* p. 47. Harder. Very common in Cape Town market.
Mugil capensis, *Blkr. Vische v.d. Kaap.* pp. 54, 69.
Mugil capensis (saliens?), *Gunth.* iii. p. 443. (Type of M. euronatus).

Mugil multilineatus, Smith.
(Springer).

Mugil multilineatus, *Smith, Illustr. Zool. S. Africa,* pl. 30. fig. 2. East and West Coasts, also some of the rivers of the interior.
Mugil multilineatus, *Pappe, Synops.* p. 19. Springer; leaping mullet.
Mugil capensis, *Cast. Mem.* p. 46. Springer.
Mugil multilineatus, *Blkr. Vische v.d. Kaap.* p. 54.
Mugil multilineatus, *Gunth.* iii. p. 443. (Type of species).

Mugil constantiæ, C. & V.

Mugil constantiæ, *Cuv. & Val.* xi. p. 107.
Mugil constantiæ, *Smith, Illustr. Zool. S. Africa,* pl. 28. fig. 1 and 1A. Fresh water lakes and rivers.
Mugil constantiæ, *Cast. Mem.* p. 48. Fresh water Springer. Peculiar to fresh waters in the neighbourhood of the Cape. Only caught in the winter (June, July, and August).
Mugil constantiæ, *Blkr. Vische v.d. Kaap.* p. 54 (quoted).
Mugil constantiæ, *Gunth.* iii. p. 418. Cape.
Mugil constantiæ, *M. Web. Zool. Jahr.* Vol. x. pt. 2 (1897). Cape Colony, in fresh water pool, called "Small Princess Vlei."

Mugil capito, Cuv.
(Harder).

Mugil capito, *Cuv. Regne Anim.* ed. 2. tom. 2. p. 232.
Mugil capito, *Cuv. & Val.* xi. p. 36, pl. 308
Mugil capito, *Gunth.* iii. p. 439. Cape of Good Hope.
Mugil capito, *Smitt, Scandinavian Fishes,* p. 339. f. 90

Mugil richardsonii, Smith.
(Harder).

Mugil richardsonii, *Smith, Illustr. Zool. S. Africa,* pl. 29. fig. 1. Inhabits the seas of the Eastern and Western Coasts.
Mugil richardsonii, *Gunth.* iii. p. 440. Cape Seas (type).

Mugil smithii, Gunth.

(Harder).

Mugil macrolepis, *Smith, Illustr. Zool. S. Africa*, pl. 28. fig. 2. (Not Rüpp or Blkr.) Rivers and fresh water lakes.
Mugil macrolepis, *Cast. Mem.* p. 47. Specimen from mouth of Gamtoos River, near Algoa Bay. Said to ascend far up into river. Very common, and sold as " harders."
Mugil macrolepis, *Blkr. Vische v.d. Kaap.* p. 54.
Mugil smithii, *Gunth.* iii. p. 447. (Type of M. macrolepis).

Mugil camptosienis, Cast.

Mugil camptosiensis, *Cast. Mem.* p. 48. Found in Gamtoos River, near Algoa Bay. Known as the Springer.

Mugil crenilepis, Cast.

Mugil crenilepis, *Cast. Mem.* p. 49. From mouth of Gamtoos River, and known as Harder.

Mugil radians, Cast.

Mugil radians, *Cast. Mem.* p. 49. Natal, where it appears to be very common.

Mugil natalensis, Cast.

Mugil natalensis, *Cast. Mem.* p. 50. Natal.

Fam.: **CENTRISCIDÆ.**

Centriscus scolopax, Linn.

Centriscus scolopax, *Linn. Syst. Nat.* i. p. 415.
Centriscus scolopax, *Blkr. Vische v.d. Kaap.* p. 55.
Centriscus scolopax, *Day, British Fishes*, i. p. 249, pl. lxix.

FAM.: **GOBIESOCIDÆ.**

Chorisochismus dentex, Pall.

Cyclopterus dentex, *Pall. Spicil.* vii. p. 6. tab. 1.
Cyclopterus dentex, *Lacep.* ii. p. 64.
Lepadogaster dentex, *Bl. Schn.* p. 2.
Gobiesox dentex, *Cuv. Regne Anim.; Mull & Trosch.*
Gobiesox gyrinus, *Valenc. in Cuv. Regne Anim. Poiss.* pl. 108. fig. 1. Cape Seas.
Chorisochismus nudus, *Bris. de Barnev. Rev. Zool.* 1846. p. 209.
Gobiesox dentex, *Blkr. Vische v.d. Kaap.* pp. 55, 75.
Gobiesox dentex, *Gunth.* iii. p. 490. Cape of Good Hope.
Chorisochismus dentex. *Kner, Novara.* p. 237. Cape of Good Hope.

FAM.: **LABYRINTHICI.**

Spirobranchus capensis, C. & V.

Spirobranchus capensis, *Cuv. & Val.* vii. p. 392, pl. 200. Rivers of Cape of Good Hope.
Spirobranchus capensis, *Cuv. Regne Anim. Illustr. Poiss.* pl. 75. fig. 1.
Spirobranchus capensis, *Gunth.* iii. p. 373. Cape of Good Hope
Spirobranchus capensis. *Kner. Novara.* p. 217. Cape of Good Hope.

Ctenopoma microlepidotum, Gunth.

Ctenopoma microlepidotum. *Gunth.* iii. pp. 373. 565. Fresh waters of Cape of Good Hope.

FAM.: **TRACHYPTERIDÆ.**

Regalecus gladius, Walb.

Cepola gladius, *Walb. Art.* iii. p. 617.
Gymnetrus gladius, *Cuv. & Val.* x. p. 352, pl. 298.
? Gymnetrus capensis, *Cuv. & Val.* x. p. 376. Cape.
Gymnetrus capensis, *Cast. Mem.* p. 45. One imperfect specimen found at the Cape.
Regalecus gladius, *Gunth.* iii. p. 308.

FAM.: **LOPHOTIDÆ.**

Lophotes cepedianus, Giorna.

Lophotes cepedianus, *Giorna, Mem. Accad. Torino*, 1803. ix. p. 19, pl. 11. fig. 1.
Lophotes cepedianus, *Cuv. & Val.* x. p. 405, pl. 301.
Lophotes cepedianus, *Gunth.* iii. p. 312. "Presented by Sir A. Smith" (Cape?)
Lophotes cepedianus, *Trimen, Proc. Zool. Soc.* 18—. False Bay.
Lophotes cepedianus, *Blgr. Mar. Inv. S. Africa*, i. p. 13, pl. Mossel Bay.

Lophotes fiskii, Gunth.

Lophotes fiskii, *Gunth. Proc. Zool. Soc.* 1890. p. 244, pl. xix and xx. Kalk Bay.

FAM.: **POMACENTRIDÆ.**

Glyphidodon sordidus, Forsk.

Chætodon sordidus, *Forsk.* p. 62. No. 87. Bl. Schn. p. 230.
Glyphisodon sordidus, *Rupp. Atl. Fische.* p. 34. taf. 8. fig. 1.
Glyphidodon sordidus, *M. Web. Zool. Jahr.* Vol. x. pt. 2. p. 146. Natal. In a pool-like bay near the mouth of the Illovo River.

FAM.: **LABRIDÆ.**

Novacula cultrata, C. & V.

Xyrichthys cultratus, *Cuv. & Val.* xiv. p. 37. pl. 391.
Novacula cultrata, *Gunth.* iv. p. 169. South Africa.

Novacula argentimaculata, Stndch.

Xyrichthys argenti-maculata, *Stndchnr. Zool. Bot. Ges. Wien.* 1861. p. 134.
Xyrichthys argenti-maculata, *Gunth.* iv. p. 170. Cape of Good Hope.

Julis hebraica, Lacep.

Labrus hebraica, *Lacep.* iii. pp. 455, 526.
Julis cingulata, *Quoy & Gaim. Voy. Astrol.* p. 711, pl. 15. fig. 3.
Julis hebraica, *Gunth.* iv. pp. 186, 508. Port Natal.

Julis trilobata, Lacep.

Labrus trilobatus, *Lacep.* iii. pp. 454, 526. (Not Shaw).
Julis bicatenatus, *Blkr. Atl. Ich.* p. 93. tab. 34. fig. 3.
Julis trilobata, *Gunth.* iv. p. 187. South Africa.

Julis güntheri, Blkr.

Julis güntheri, *Blkr. Versl. Akad. Wet. Amst.* xiii. p. 279, and *Atl. Ichth.* p. 94. tab. 34. fig. 1.
Julis güntheri, *Gunth.* iv. p. 189. Cape of Good Hope.

Fam.: **GERRIDÆ.**

Gerres longirostris, Rapp.

Gerres longirostris, *Rapp.*
Gerres longirostris, *Gunth. Proc. Zool. Soc.* 1861. p. 142, pl. 24, and Cat. iv. p. 253. Cape of Good Hope.

Fam.: **CICHLIDÆ (CHROMIDÆ.)**

Tilapia sparrmanni, Smith.

Tilapia sparrmanni, *Smith, Illustr. Zool. S. Afr.* pl. v. In small fresh water streams to the north of the Orange River. Bury in mud in dry season.
Chromis sparrmanni, *Gunth.* iv. p. 269. (Type of species).
Chromys sparrmanni, *Cast. Mem.* p. 12. Lake N'gami.
Chromys sparrmanni (Cast), *Blgr. Proc. Zool. Soc.* 1899. p. 140.
? Chromis niloticus, *Peters, Reise nach Mossambique.* p. 23, pl. iv. fig. 1-4.
Chromis (sparrmanni Smith juv?), *M. Web. Zool. Jahr.* Vol. x. pt. 2. p. 146. 1897. Natal: Umhlasine stream near Verulam.

Tilapia sparrmanni, *Blgr. Proc. Zool. Soc.* 1899. p. 118. South-West Africa from Angola and the Victoria Falls to Namaqualand.

Tilapia nilotica, Linn.

Chromis niloticus, *Linn. in Hasselq. Iter Palestinense.* p. 346. (1757).
Chromis niloticus (part), *Gunth.* iv. pp. 267, 510. Black fish. Port Natal.
Chromis niloticus, *M. Web. Zool. Jahr.* Vol. x. pt. 2. p. 149. Natal: Illovo River; Umhloti River at Verulam; mouth of Umhloti River. Transvaal: District Pretoria; Zondag River, District Rustenberg.
Chromis (niloticus Hasselq?), *M. Web.* l.c. Natal: Illovo River.
Chromis niloticus, Hasselq. var. mossambicus Pet. *M. Web.* l.c. Natal: Illovo River.
Tilapia nilotica, *Blgr. Proc. Zool. Soc.* xv. 1898. p. 6, and *Proc. Zool. Soc.* 1899. p. 112.

Tilapia natalensis, M. Web.

Chromis natalensis, *M. Web. Zool. Jahr.* Bd. x. *Heft.* 2. p. 147. (1897). Illovo River, Natal.
Tilapia natalensis, *Blgr. Proc. Zool. Soc.* 1899. p. 113. East and South-East Africa from the Coast of Zanzibar to Natal.

Tilapia philander, M. Web.

Chromis (Ctenochromis) philander, *M. Web. Zool. Jahr.* Bd. x. *Heft.* 2. p. 148 (1897). Natal: Umhloti River at Verulam; Umhlasine stream at Redcliff.
Tilapia philander, *Blgr. Proc. Zool. Soc.* 1899. p. 136. Natal. Transvaal.

Paratilapia moffati, Cast.

Chromys moffati, *Cast. Mem.* p. 16. River Kuruman.
Paratilapia moffati, *Blgr. Proc. Zool. Soc.* 1898. p. 140. Pretoria, Transvaal.

Paratilapia thumbergii, Cast.

Chromys thumbergii, *Cast. Mem.* p. 13. Lake N'gami.
Chromys n'gamensis, *Cast.* l.c. Lake N'gami.
Chromys livingstonii, *Cast.* l.c. Lake N'gami.
Paratilapia thumbergii, *Blgr. Proc. Zool. Soc.* 1898. p. 146. Lake N'gami.

Chromidotilapia (?) frederici, Cast.

Chromys frederici, *Cast. Mem.* p. 15. Lake N'gami.
Chromidotilapia (?) frederici, *Blgr. Proc. Zool. Soc.* 1898. p. 151 (quoted).

Hemichromis fasciatus, Peters.

Hemichromis fasciatus, *Peters, Monatsber. Berl. Ac.* 1857. p. 403.
Chromichthys elongatus, *Dumer, Ann. Mus.* x. p. 257, pl. 22. fig. 3.
Chromichthys fasciatus, *M. Web. Zool. Jahr.* x. pt. 2. Transvaal: Matlabas River.
Hemichromis fasciatus, *Blgr. Proc. Zool. Soc.* 1898. p. 135.

Hemichromis bimaculatus, Gill.

Hemichromis bimaculatus, *Gill, Proc. Ac. Philad.* 1862. p. 137.
Hemichromis guttatus, *Gunth.* iv. p. 275. Cape Colony.
Hemichromis (guttatus, *Gunth*?) *M. Web. Zool. Jahr.* Vol. x. pt. 2. p. 149. Natal: Umbilo River; Umhloti River at Verulam.
Hemichromis bimaculatus, *Blgr. Proc. Zool. Soc.* 1898. p. 136.

Chromys sparmanni
Chromys andersonii
Chromys chapmani
Chromys smithii
Chromys lavaillanti

Cast. Mem. pp. 12-16. Lake N'gami. *Blgr. Proc. Zool. Soc.*, 1898, p. 140. "Insufficiently described."

Order II—ANACANTHINI.

FAM.: GADIDÆ

Merluccius vulgaris, Flem.
(Stock-fish).

Merluccius vulgaris, *Flem. Brit. An.* p. 195.
Gadus merlucius, *Pappe, Synops.* p. 21. Stok-visch, Hake. Utterly unknown at the Cape of Good Hope before the earthquake of 1809 (4th Dec.). At first it was scarce, but now caught in great numbers.
Merluccius capensis, *Cast. Mem.* p. 68. Sok Visch. Occasionally appears in great shoals, especially in winter.

Genypterus capensis, Smith.
(King Klip-fish).

Muraenoides, *Barrow, Travels,* p. 30. King rock-fish. Sometimes caught in Table Bay (1797).
Ophidium blacodes, pt., *Forst. Descr. Anim.* p. 115. 1844. (Bl. Schn. p. 485). De Koning van Klipvischen. Cape of Good Hope.
Xiphiurus capensis, *Smith, Illustr. Zool. S. Africa,* pl. 31. Koning Klip Visch. During one of the several earthquakes which occurred many years ago at the Cape of Good Hope one or more sand banks were found near the entrance to Table Bay, and not long after the first specimens of the fish were obtained. Since then it has always been in the market, but on no occasion in great abundance.
Xiphiurus capensis, *Pappe, Synops.* p. 21. Rather scarce.
Xiphiurus capensis, *Cast. Mem.* p. 70. Kings Rock fish. Koninglip. Very rare.
Hoplophycis lalandii, *Kaup in Wiegm. Arch.* 1858. p. 93.
Genypterus capensis, *Gunth.* iv. p. 379. Cape. (Type of species).

Motella capensis, Kaup.

Motella capensis, *Kaup in Wiegm. Arch.* 1858. S. 90. taf. xiii. fig. 3. Cape.
? Motella capensis, *Kner, Novara.* p. 279. Cape.

Algoa viridis, Cast.

Algoa viridis, *Cast. Mem.* p. 69. Taken at the mouth of the Zwartkops River, Algoa Bay, in January.

Fam.: **PLEURONECTIDÆ.**

Synaptura pectoralis, Kaup.

(Tong, Sole).

Synaptura pectoralis, *Kaup in Wiegm. Arch.* 1858. p. 96. Cape of Good Hope.
Synaptura pectoralis, *Gunth.* iv. p. 483 (quoted).
Synaptura pectoralis, *Blgr. Mar. Inv. S. Africa,* i. p. 3. Cape, Algoa Bay.

Synaptura microlepis, Blkr.

Synaptura microlepis, *Blkr. Versl. Akad. Vet. Amstrd.* xv. 1863. p. 465.
Synaptura microlepis, *Blgr. Mar. Inv. S. Africa,* i. p. 3. West Coast, near Dassen Island.

Synaptura marginata, Blgr.

Synaptura marginata, *Blgr. Mar. Inv. S. Africa,* i. p. 11. Algoa Bay, 22 fms.

Synaptura zebra, Bl

Pleuronectes zebra, *Bloch, Ausl. Fische,* iii. p. 27. tab. 187.
Solea zebrina, *Schlegel, Faun. Japon. Poiss.* p. 186, pl. 95. fig. 1.
Solea zebrina, *Gunth.* iv. p. 484. Presented by Sir A. Smith (S. Africa?).

Cynoglossus capensis, Kaup.

(Tong, Sole).

Solea vulgaris, *Pappe, Synops.* p. 22. Tong, Sole. Not common.
Trulla capensis, *Kaup, Arch. Nat.* 1858. p. 109.

Plagusia capensis, *Cast. Mem.* p. 71. Very rare. Found chiefly in August and September.
Solea vulgaris, *Blkr. Vische v.d. Kaap.* p. 56.
Cynoglossus capensis, *Gunth.* iv. p. 503. Cape of Good Hope.
Cynoglossus capensis, *Blgr. Mar. Inv. S. Africa,* i. p. 4. Found in abundance in False Bay, and one specimen near Dassen Island. Algoa Bay.

Solea bleekeri, Blgr.

Pegusa impar (non Benn.), *Blkr. Versl. Akad. Vet. Amsterd.* xv. 1863. p. 458. Cape of Good Hope.
Solea bleekeri, *Blgr. Mar. Inv. S. Africa,* i. p. 2. Cape.

Arnoglossus capensis, Blgr.

Arnoglossus capensis, *Blgr. Mar. Inv. S. Africa,* i. p. 1. False Bay.

Achirus capensis, Kaup.

Heteromycteris capensis, *Kaup, Arch. f. Nat.* 1858. p. 103.
Achirus capensis, *Blgr. Mar. Inv. S. Africa,* Vol. i. p. 2.

Pseudorhombus arsius, Blkr.

Pseudorhombus arsius, *Blkr. Beng. en Hind.* p. 76.
Pseudorhombus russellii, *Gunth.* iv. p. 424. Umbilo River (Port Natal), within five miles of the mouth.
Pseudorhombus arsius, *Day, Fishes of India,* p. 423, pl. xci. fig. 5.

Order III—PHYSOSTOMI.

Fam.: **SILURIDÆ**.

Eutropius depressirostris, Peters.

Eutropius depressirostris, *Peters. Bericht der K. Pr. Ak. Wiss.* 152. p. 682. *Reise nach Mossambique*, p. 25, pl. iv. fig. 5.
Eutropius depressirostris, *M. Web. Zool. Jahr.* Vol. x. pt. 2. p. 149. Transvaal: Matlabas River, District Waterberg.

Clarias gariepinus, Burch.
(Barbel).

Silurus (Heterobranchus) gariepinus, *Burchell, Travels in the Interior of Africa,* i. p. 425. fig. p. 445. Gariep River.
? Clarias capensis, *Cuv. & Val.* xv. p. 377. Cape.
Clarias capensis, *Smith, Illustr. Zool. S. Africa,* pl. 27. Specimen described caught in a large lake near to Port Natal, immediately to the south of the Umgeni River. Occurs in most of the rivers of the interior of S. Africa. Common in the Orange River and tributaries, but not known further south.
Clarias capensis, *Cast. Mem.* p. 62. Orange River.
Clarias capensis, *Blkr. Vische v.d. Kaap.* p. 55.
Clarias gariepinus, *Gunth.* v. p. 14. Port Natal.
Clarias gariepinus, *M. Web. Zool. Jahr.* x. pt. 2. p. 149. Cape Colony: Orange River, near Vioolsdrift, Klein-Namaqualand.

Clarias theodoræ, M. Web.

Clarias theodoræ, *M. Web. Zool. Jahr.* Bd. x. pt. 2. p. 150. Natal: Umhloti River.

Galeichthys feliceps, C. & V.
(Bagger).

Galeichthys feliceps, *Cuv. & Val.* xv. p. 29, pl. 424. In the neighbourhood of the Cape.
Bagrus capensis, *Smith, Illustr. Zool. S. Africa,* pl. 8.

Bagrus capensis, *Pappe, Synops.* p. 62. Bagger. Very common in the Cape market, especially in winter.
Galeichthys feliceps, *Blkr. Vische v.d. Kaap.* pp. 55, 76.
Galeichthys feliceps, *Gunth.* v. p. 175. Cape of Good Hope.

Galeichthys ater, Cast.

(Black Bagger).

Galeichthys ater, *Cast. Mem.* p. 62. Cape Seas. Rare.

Fam.: **CYPRINIDÆ.**

Abrostomus umbratus, Smith.

Abrostomus umbratus, *Smith, Illustr. Zool. S. Africa,* pl. 12. fig. 1. Stream north of Orange River.
Abrostomus umbratus, *Cast. Mem.* p. 57 (quoted).
Abrostomus umbratus, *Gunth.* vii. p. 68 (quoted).

Abrostomus capensis, Smith.

Abrostomus capensis, *Smith, Illustr. Zool. S. Africa,* pl. 12. fig. 2. In many of the rivers of Cape Colony.
Abrostomus capensis, *Gunth.* vii. p. 68.

Labeo sicheli, Cast.

Labeo sicheli, *Cast. Mem.* p. 60. Upper parts of Orange River.
Labeo sicheli (Cast), *Gunth.* vii. p. 68. Probably belongs to the genus Abrostomus.

Labeo cafer, Cast.

Labeo cafer, *Cast. Mem.* p. 60. In river traversing Cat River Settlement in the N.W. of Caffraria, a branch of the Great Fish River.
Labeo caffer (Cast), *Gunth.* vii. p. 68. Probably belongs to the genus Abrostomus.

Barbus burchelli, Smith.

Barbus burchelli, *Smith, Illustr. Zool. S. Africa*, pl. 11. fig. 1. Small fish inhabiting streams in various parts of Cape Colony.
Barbus burchelli, *Cast. Mem.* p. 61 (quoted).
Barbus burchelli, *Gunth.* vii. p. 96 (quoted).

Barbus capensis, Smith.

Barbus (Cheilobarbus) capensis, *Smith, Illustr. Zool. S. Africa*, pl. 10. fig. 1. Taken in rivers of the Western Coast of S. Africa, more particularly the Breede and Olifants Rivers.
Barbus capensis, *Gunth.* vii. p. 98. (Type of species).
Barbus capensis, *M. Web. Zool. Jahr.* x. pt. 2. p. 151, 1897. Cape Colony: Stream at French Hoek, district Paarl; Berg River at Paarl. Orange River at Vioolsdrift in Lesser Namaqualand.

Barbus marequensis, Smith.

Barbus (Cheilobarbus) marequensis, *Smith, Illustr. Zool. S. Africa*, pl. 10. fig. 2. Rivers of interior of S. Africa.
Barbus marequensis, *Gunth.* vii. p. 100. (Type of species).

Barbus holubi, Stndch.

Barbus holubi, *Stndchnr. Ichth. Beitrage*, xvii. p. 7. Modder River, tributary of Vaal.
Barbus holubi, *M. Web. Zool. Jahr.* x. pt. 2. p. 151. 1897. Natal: Umhloti River at Verulam; Illovo River; Klip River (River Mambit) at Ladysmith.

Barbus paludinosus, Peters.

Barbus paludinosus, *Peters, Bericht der K. Pr. Akad. d. Wiss. zu Berlin*, 1852. p. 683.
Barbus paludinosus, *Peters, Reise nach Mossambique*, p. 51. taf. xi. fig. 1.
Barbus paludinosus, *M. Web. Zool. Jahr.* x. pt. 2. p. 151. 1897. Natal: Umhloti River at Verulam; Illovo River.

Barbus multimaculatus, Stndch.

Barbus multimaculatus, *Stndchnr.*
Barbus multimaculatus, *M. Web. Zool. Jahr.* x. pt. 2. p. 191. S. Africa. Protea region.

Barbus serra, Peters.

Barbus serra, *Peters, Monatsber. Ak. Wiss. Berlin.* 1864. p. 394. Cape of Good Hope.
Barbus serra, *Gunth.* vii. p. 94 (quoted).
Barbus serra, *M. Web. Zool. Jahr.* x. pt. 2. p. 192 (quoted). Protea region?

Barbus afer, Peters.

Barbus (Capœta) afer, *Peters, Monatsber. Ak. Wiss. Berlin.* 1864. p. 395. Cape of Good Hope.
Barbus afer, *Gunth.* vii. p. 148 (quoted).
Barbus afer, *M. Web. Zool. Jahr.* x. pt. 2. p. 192, 1897 (quoted). Protea region?

Barbus gobionoides, C. & V.

Barbus gobionoides, *Cuv. & Val.* xvi. p. 189. Cape of Good Hope.
? Barbus pallidus, *Smith, Illustr. Zool. S. Africa*, pl. 11. fig. 2. Clear streams in various parts of Cape Colony.
Barbus gobionoides, *Cast. Mem.* p. 61 (quoted).
? Gnathendelia vulnerata, *Cast. Mem.* p. 57. Rui-flerke. Very common in the river at Genadendal, a branch of the Breede River, where it also occurs.
Barbus gobionoides, *Gunth.* vii. p. 106 (quoted).
Barbus gobionoides, *M. Web. Zool. Jahr.* x. pt. 2. p. 190 (quoted). Protea region?

Barbus unitæniatus, Gunth.

Puntius vittatus, *Stndchnr. Verh. Zool. Bot. Ges. Wien.* 1866. p. 767. taf. 17. fig. 2. (Not Day).
Barbus unitæniatus, *Gunth. Record of Zool. Lit.* iii. p. 151. (Name only).
Barbus unitæniatus, *M. Web. Zool. Jahr.* x. pt. 2. p. 151. Transvaal: At Pretoria.

Barbus trimaculatus, Peters.

Barbus trimaculatus, *Peters, Bericht der K. Pr. Ak. d. Wiss. zu Berlin,* 1852. p. 683; *Reise nach Mossambique,* p. 55. taf. xi. fig. 4. Rivungo River, near Tette.
Barbus trimaculatus, *Stndchnr. Ichth. Beitr.* xvii. *in S.B. Akad. Wiss. Wien.* 1894. Limpopo.
Barbus trimaculatus, *M. Web. Zool. Jahr.* x. pt. 2. p. 151. Transvaal: Zondag River, District Rustenberg.

Barbus anoplus, M. Web.

Barbus anoplus, *M. Web. Zool. Jahr.* Bd. x. pt. 2. p. 151 (1897). Cape Colony: Buffels River at Laingsburg; Stream at Fransch Hoek. Natal: Klip River (called also Mambit) at Ladysmith.

Barbus motebensis, Stndch.

Barbus motebensis, *Stndchnr. Ichth. Beitr.* xvii. p. 11. taf. 11. fig. 2-2A. Mo-te-be-spruit left tributary of Upper Notuany in Manio district (Western S.A. Republic).
Barbus motebensis, *M. Web. Zool. Jahr.* x. pt. 2. p. 152, 191. Savanna Region.

Barbus viviparus, M. Web.

Barbus viviparus, *M. Web. Zool. Jahr.* Bd. x. pt. 2. p. 152. Natal: River at Isipingo; Umhloti River at Verulam; Umhlasine Stream at Verulam.

Barbus gurneyi, Gunth.

Barbus gurneyi, *Gunth.* vii. p. 102. Port Natal.
Barbus gurneyi, *M. Web. Zool. Jahr.* x. pt. 2. p. 153. Umbilo River.

Barbus bynni, C. & V.

Barbus bynni, *Cuv. & Val.* xvi. p. 174. Nile.
Barbus bynni, *Gunth.* vii. p. 104.
Barbus bynni, *M. Web. Zool. Jahr.* x. pt. 2. p. 153. Natal: Illovo River.

Barbus natalensis, Cast.

Barbus natalensis, *Cast. Mem.* p. 59. Tugela River in Natal.
Barbus natalensis, *Gunth.* vii. p. 83 (quoted).
Barbus natalensis, *M. Web. Zool. Jahr.* x. pt. 2. p. 191. Savanna region (quoted).

Barbus kurumanni, Cast.

Barbus kurumanni, *Cast. Mem.* p. 59. Kuruman River.
Barbus kurumanni, *Gunth.* vii. p. 148 (quoted).
Barbus kurumanni, *M. Web. Zool. Jahr.* x. pt. 2. p. 191. Kalahari Region (quoted).

Barbus breijeri, M. Web.

Barbus breijeri, *M. Web. Zool. Jahr.* Bd. x. pt. 2. p. 154. Pretoria.

Cyprinus longicaudis, Cast.

Cyprinus longicaudis, *Cast. Mem.* p. 58. From a river of Interior Great Namaqualand.

Carassius auratus, Linn.

(Goldfish).

Cyprinus auratus, *Linn. Syst. Nat.* i. p. 527.
Carassius vulgaris, var. capensis, *Peters, Monatsber. Ak. Wiss. Berlin,* 1864. p. 393.
Carassius auratus, *Gunth.* vii. p. 32.

Fam.: **STERNOPTYCHIDÆ.**

Argyropelecus olfersii, Cuv.

Sternoptyx olfersii, *Cuv. Regne An.* 2nd Ed. ii. p. 316, pl. 13. fig. 2.
Argyropelecus olfersii, *Cuv. & Val.* xxii. p. 408. A few miles S.E. of the Cape of Good Hope.
Argyropelecus olfersii, *Blkr. Vische v.d. Kaap.* p. 56 (quoted).
Argyropelecus olfersii, *Smitt, Scandinavian Fishes.* p. 925. fig. 233.

Fam.: SCOMBRESOCIDÆ.

Belone capensis, Gunth.

Belone capensis, *Gunth.* vi. p. 247. Cape of Good Hope.

Belone natalensis, Gunth.

Belone natalensis, *Gunth.* vi. p. 243. Port Natal.

Scombresox rondeletii, C. & V.

Scombresox rondelettii, *Cuv. & Val.* xviii. p. 472.
Scombresox rondelettii, *Blkr. Vische v.d Kaap.* p. 56.

Scombresox saurus, Walb.

Esox saurus, *Walbaum. Artedi.* iii. p. 93.
Scombresox camperi, *Cuv. & Val.* xviii. p. 465. Cape?
Scombresox saurus, *Blkr. Vische v.d. Kaap.* p. 56.
Scombresox saurus, *Gunth.* vi. p. 257. Cape of Good Hope.

Hemiramphus obesus, Cast.

Hemiramphus obesus, *Cast. Mem.* p. 65. Port Natal.

Exocœtus evolans, Linn.

Exocœtus evolans, *Linn, Syst. Nat.* i. p. 521.
Exocœtus evolans, *Cuv. & Val.* xix. p. 138.
Exocœtus evolans, *Blkr. Vische v.d. Kaap.* p. 35. South Atlantic.

Exocœtus altipinnis, C. & V.

Exocœtus altipinnis, *Cuv. & Val.* xix. p. 109, pl. 560. Indian Ocean.
Exocœtus altipinnis, *Cast. Mem.* p. 64. Sent from Algoa Bay; probably does not leave Agulhas Bank.

Exocœtus longipinnis, Cast.

Exocœtus longipinnis, *Cast. Mem.* p. 64. Found on Agulhas Bank.

Exocœtus chloropterus, C. & V.

Exocœtus chloropterus, *Cuv. & Val.* xix. p. 109.
Exocœtus chloropterus, *Blkr. Vische v.d. Kaap.* p. 56.

Fam.: GALAXIIDÆ.

Galaxias capensis, Stndch.

Galaxias capensis, *Stndchnr. Ich. Beitr.* xvii. p. 18. Lorenz River, 12½ miles from mouth.
Galaxias capensis, *M. Web. Zool. Jahrb.* x. Heft 2. 1897. Klein-Princessen Vlei at Diep River. Stream at Newlands and French Hoek.
? Cobitis zebrata, *Cast. Mem.* p. 56. Fresh water on Flats near Cape Town.
? Cobitis zebrata, *Gunth.* vii. p. 347. Cape Town. (=Nemachilus).

Fam.: GONORHYNCHIDÆ.

Gonorhynchus greyi, Richards.

Gonorhynchus greyi, *Richards. Voy. Ereb. and Terr. Fish.* p. 44.
Gonorhynchus greyi, *Cuv. & Val.* xix. p. 212. Cape of Good Hope.
Gonorhynchus gronovii, *Cuv. & Val.* xix. p. 207, pl. 568.
Gonorhynchus gronovii, *Blkr. Vische v.d. Kaap.* p. 56.
Gonorhynchus greyi, *Gunth.* vii. p. 373. Cape of Good Hope.

Fam: CLUPEIDÆ.

Clupea ocellata, Pappe.

(Sardijn, Herring).

Clupea ocellata, *Pappe, Synops.* p. 20. Shad, Sardijn.
Clupea ocellata, *Blkr. Vische v.d. Kaap.* p. 56.
Clupea ocellata, *Cast. Mem.* p. 67. Shad. Found in summer, but very rare.

Engraulis holodon, Blgr.
(Anchovy).

Engraulis encrasicholus, *Pappe, Synops.* p. 21. Ansjovis, Anchovy. Caught sometimes abundantly with the net in the summer.
Engraulis encrasicholus, *Blkr. Vische v.d. Kaap.* p. 56.
Engraulis encrasicholus (?), *Cast. Mem.* p. 68. Ansjovis.
Engraulis holodon, *Blgr. Mar. Inv. S. Africa,* i. p. 12. Zwartkops River, Algoa Bay.

Albula conorynchus, Bl.

Albula conorynchus, *Bl. Schn.* p. 432.
Albula conorynchus, *Gunth.* vii. p. 468. Port Natal.

Elops saurus, Linn.
(" Cape Salmon " of Port Elizabeth).

Elops saurus, *Linn. Syst. Nat.* i. p. 518.
Elops capensis, *Smith, Illustr. Zool. S. Africa,* pl. 7.
Elops capensis, *Cast. Mem.* p. 67. Port Natal.
Elops saurus, *Blkr. Vische v.d. Kaap.* p. 56.
Elops saurus, *Gunth.* vii. p. 470. Cape of Good Hope.
Elops saurus, *Day, Fishes of India,* p. 649, pl. clxvi. fig. 1.

Fam.: **MURÆNIDÆ.**

Ophichthys serpens, Linn.

Muræna serpens, *Linn. Syst. Nat.* i. p. 425.
Leptorhynchus capensis, *Smith, Illustr. Zool. S. Africa,* pl. 6. Occasionally taken in nets in Table Bay.
Leptorhynchus capensis, *Cast. Mem.* p. 73 (quoted).
Leptorhynchus capensis, *Blkr. Vische v.d. Kaap.* p. 56.
Ophisurus serpens, *Kaup, Apod.* p. 7. One in Leyden Museum from Cape of Good Hope.
Ophichthys serpens, *Gunth.* viii. p. 65. Damara Land.

Anguilla delalandi, Kaup.

Anguilla capensis, *Cast. Mem.* p. 73. Found in almost all the rivers of the Colony and Caffraria.
Anguilla delalandi, *Kaup, Apod.* p. 50. fig. 41. Great Fish River.

? Muræna macrocephala, *Rapp, Wurzburgische Jahreshefte* iv. p. 142. Port Natal.
? Anguilla capensis, *Cast. Mem.* p. 73. Found in almost all the rivers of the Colony and in Caffraria.
Anguilla delalandei, *Blkr. Vische v.d. Kaap.* p. 56 (quoted).
Anguilla delalandii, *Gunth.* viii. p. 33. South Africa.

Anguilla labiata, Peters.

Anguilla labiata, *Peters, Wiegm. Arch.* 1855. p. 270, and *Reise nach Mossambique,* p. 94. taf. 17.
Anguilla labiata, *Gunth. Zanzibar,* p. 124, and Cat. viii. p. 26. Port Natal.

Muræna nebulosa, Ahl.

Muræna nebulosa, *Ahl. De Mur. et Ophichth.* p. 5. tab. i. fig. 2.
Pœcilophis variegata, *Kaup, Apod.* p. 98. tab. 13. fig. 97.
Muræna nebulosa, *Gunth.* viii. p. 130. Port Natal.

Muræna flavomarginata, Rupp.

Muræna flavomarginata, *Rupp. Atl.* p. 119. taf. 30. fig. 3.
Muræna flavomarginata, *Gunth.* viii. p. 119. Port Natal.

Leptocephalus capensis, Kaup.

Leptocephalus capensis, *Kaup, Apod.* p. 153. Cape of Good Hope.

Leptocephalus morisii, Gmel.

Leptocephalus morissi, *Gmelin, Syst. Nat.* i. p. 1150.
Leptocephalus morissi, *Blkr. Vische v.d. Kaap.* p. 56.

Order IV—LOPHOBRANCHII.

Fam.: **SYNGNATHIDÆ.**

Syngnathus acus, Linn.

Syngnathus acus, *Linn. Syst. Nat.* i. p. 416.
Syngnathus delalandi, *Kaup, Lophobr.* p. 45.
Syngnathus delalandei, *Blkr. Vische v.d. Kaap.* p. 56.
Syngnathus delalandi, *Gunth.* viii. p. 157. Cape of Good Hope.

Syngnathus phlegon, Risso.

Syngnathus phlegon, *Risso, Eur. Merid.* iii. p. 181.
Syngnathus phlegon, *Kaup. Lophobr.* p. 41. Cape of Good Hope.
Syngnathus phlegon, *Blkr. Vische v.d. Kaap.* p. 56.
Syngnathus phlegon, *Gunth.* viii. p. 156. Cape of Good Hope.

Syngnathus pelagicus, Osb

Syngnathus pelagicus, *Osbeck Voyage*, ii. p. 113.
Syngnathus pelagicus, *Bloch*, p. 109. fig. 4.
Syngnathus pelagicus (Linn), *Kaup, Lophobr.* p. 36. Cape of Good Hope.
Syngnathus pelagicus, *Blkr. Vische v.d. Kaap.* p. 56.

Syngnathus temminckii, Kaup.

Syngnathus temminckii, *Kaup, Lophobr.* p. 36. Cape of Good Hope.
Syngnathus temminckii, *Blkr. Vische v.d. Kaap.* p. 56.
Syngnathus temminckii, *Gunth.* viii. p. 165. Cape of Good Hope.

Hippocampus capensis, Blgr.

Hippocampus capensis, *Blgr. Mar. Inv. S. Africa.* Vol. i. p. 11.
? Hippocampus sp., *Cast. Mem.* p. 74.

Order V—PLECTOGNATHI.

Fam. : SCLERODERMI.

Balistes maculatus, Gm.

Balistes maculatus, *Gm. L.* i. p. 1468.
Balistes maculatus, *Gunth.* viii. p. 213. Cape of Good Hope.
Balistes maculatus, *Day, Fishes of India,* p. 687, pl. clxxv. fig. 3.

Balistes vetula, Linn.

Balistes vetula, *Linn. Syst. Nat.* i. p. 406.
Balistes vetula, *Gunth.* viii. p. 215. Cape of Good Hope.

Balistes mitis, Benn.

Balistes mitis, *Bennett, Proc. Comm. Zool. Soc.* i. p. 169.
Balistes mitis, *Gunth.* viii. p. 218. Port Natal.
Balistes mitis, *Day, Fishes of India,* p. 689, pl. clxxvii. fig. 3.

Monacanthus setifer, Benn.

Monacanthus setifer, *Bennett, Proc. Comm. Zool. Soc.* p. 112. 1830.
Monocanthus setifer, *Schlegel, Faun. Japon.* p. 290, pl. 130. fig. 1.
Monacanthus auratus, *Cast. Mem.* p. 77. Algoa Bay.
Monacanthus setifer, *Gunth.* viii. p. 239. Port Natal.

Monocanthus pardalis, Rupp.

Monocanthus pardalis, *Rupp. N.W. Fisch.* (1855). p. 57. taf. 15. fig. 3.
Monacanthus fronticinctus, *Gunth. Fish. Zanz.* p. 136, pl. 19. fig. 2.
Monocanthus pardalis, *Gunth.* viii. p. 230. Cape of Good Hope.

Ostracion concatenatus, Bl.

Ostracion concatenatus, *Bl.* taf. 131.
Ostracion bicuspis, *Smith, Illustr. Zool. S. Africa*, pl. 18. Inhabits the sea of S. Africa, and found most frequently in the bays of the South-Eastern Coast.
Ostracion bicuspis, *Cast. Mem.* p. 78.
Ostracion concatenatus, *Blkr. Vische v.d. Kaap.* p. 57.
Ostracion concatenatus, *Gunth.* viii. 259. Cape of Good Hope.

Ostracion diaphanus, Bl.

Ostracion diaphanus, *Bl. Schn.* p. 501.
Ostracion undecim-aculeatus, *Smith, Illustr. Zool. S. Africa*, pl. 17. Frequently found on the beach after gales of wind, both to the East and Northward of Cape Town, and individuals are occasionally taken in the nets in Table Bay.
Ostracion undecim-aculeatus, *Cast. Mem.* p. 78. Algoa Bay.
Ostracion diaphanus, *Blkr. Vische v.d. Kaap.* p. 57.
Ostracion diaphanus, *Gunth.* viii. p. 264. (Types of O. undecim-aculeatus).

Ostracion cornutus, Linn.

Ostracion cornutus, *Linn. Syst. Nat.* i. p. 409.
Ostracion (Acanthostracion) arcus, *Blkr. Atl. Ich. Ostr.* p. 35, pl. 2. fig. 3, pl. 4. fig. 4.
Ostracion cornutus, *Gunth.* viii. p. 265. Port Natal.

Fam.: **GYMNODONTES.**

Orthagoriscus mola, Linn.

Tetrodon mola, *Linn. Syst. Nat.* i. p. 412.
Orthagoriscus mola, *Cast. Mem.* p. 75. Occasionally at the Cape of Good Hope.
? Pedalion capensis, *Cast. Mem.* p. 75. One found in Table Bay 5th November, 1856.

Orthagoriscus truncatus, Retz.

Tetrodon truncatus, *Retz. Svensk. Vet. Ak. Nya Handl.* vi. 2. p. 116.
Orthagoriscus oblongus, *Cast. Mem.* p. 75.
Orthagoriscus oblongus, *Blkr. Vische v.d. Kaap.* p. 57.
Orthagoriscus truncatus, *Gunth.* viii. p. 319. Cape Seas.

Dicotylichthys punctulatus, Kaup.

Dicotylichthys punctulatus, *Kaup, Wiegm. Arch.* 1855. p. 230.
Dicotylichthys punctulatus, *Gunth.* viii. p. 315. Cape.

Chilomycterus echinatus, Gronov.

Holocanthus echinatus, *Gronov. Syst. ed. Gray*, p. 27.
Holocanthus echinatus, *Gunth.* viii. p. 312. Cape.

Chilomycterus antennatus, Cuv

Diodon antennatus, *Cuv. Mem. Mus* 1818. p. 131. c. fig.
Diodon antennatus, *Gunth.* viii. p. 311. Cape of Good Hope.

Chilomycterus geometricus, Bl.

Diodon geometricus, *Bl. Schn.* p. 513. taf. 96.
Diodon geometricus, *Gunth*. viii. p. 310. Cape Seas.

Chilomycterus orbicularis, Bl.

Diodon orbicularis, *Bl.* tab. 127.
Diodon orbicularis, *Atl. Ichth. Gymn.* p. 55, pl. 1. fig. 4.
Diodon orbicularis, *Cast. Mem.* p. 74.
Diodon orbicularis, *Blkr. Vische v.d. Kaap.* p. 57.
Chilomycterus orbicularis, *Gunth.* viii. p. 312. Indian Ocean.

Diodon maculatus, Gunth.

Diodon maculatus, *Gunth.* viii. p. 307. Cape of Good Hope.
Diodon sexmaculatus, *Cuv. Mem. Mus.* iv. p. 136. c. fig.
Diodon sexmaculatus, *Blkr. Vische v.d. Kaap.* p. 57.

Diodon maculifer, Kaup.

Diodon maculifer, *Kaup, Wiegm. Arch.* 1855. p. 229.
Diodon maculifer, *Blkr. Vische v.d. Kaap.* p. 57.
Diodon maculifer, *Gunth.* viii. p. 309. Cape.

Diodon spinosissimus, Cuv.

Diodon spinosissimus, *Cuv. Mem. Mus.* iv. p. 134.
Diodon spinosissimus, *Gunth.* viii. p. 307. Cape of Good Hope.

Diodon hystrix, Linn.

Diodon hystrix, *Linn. Syst. Nat.* i. p. 413.
Diodon hystrix, *Cast. Mem.* p. 74. (Name only).
Diodon atinga, *Cast. Mem.* p. 74. (Name only).
Diodon atinga, *Bloch,* tab. 125; *Blkr. Vische v.d. Kaap.* p. 57.
Diodon hystrix, *Gunth.* viii. p. 306. Cape Seas.
Diodon hystrix, *Day, Fishes of India,* p. 708, pl. clxxix. fig. 4.

Tetrodon blochii, Cast.

Tetraodon blochii, *Cast. Mem.* p. 75. Kalk Bay.

Tetrodon cutaneus, Gunth.

Tetrodon cutaneus, *Gunth.* viii. p. 287. Cape of Good Hope?

Tetrodon honckenii, Bl.

(Blaasop).

Tetraodon honckenii, *Bloch, Aus. Fish.* i. p. 133. tab. 143.
Tetraodon honkenyi, *Pappe, Synops.* p. 4. Simon's Bay and along East shore.
Tetraodon honkenii, *Cast. Mem.* p. 74. Common in all the Bays on the South Coast of the Colony, but never found in Table Bay nor on the West Coast. Specially abundant in Simon's Bay.
Gastrophysus honckenii, *Blkr. Vische v.d. Kaap.* p. 57.
Tetrodon honckenii, *Gunth.* viii. p. 276. Cape.
Tetraodon honckenii, *Kner, Novara,* p. 406. Cape of Good Hope.

Tetrodon lunaris, Bl. Schn.

Tetrodon lunaris, *Bl. Schn.* p. 505.
Tetrodon lunaris, *Schleg. Faun. Japon.* p. 277, pl. 122. fig. 1.
Tetrodon lunaris, *Gunth.* viii. p. 274. Cape Seas.

Tetrodon lagocephalus, Linn.

Tetrodon lagocephalus, *Linn. Amoen. Acad.* i. p. 310. tab. 13. fig. 4. (Bad).
Tetrodon lagocephalus, *Gunth.* viii. p. 273. South Africa.

Tetrodon stellatus, Blkr.

Crayracion stellatus, *Blkr. Atl. Ichth.* v. p. 73. t. ccix. fig. 2.
Tetrodon stellatus, *Gunth.* viii. p. 294. Port Natal.
Tetrodon stellatus, *Day, Fishes of India*, p. 705, pl. clxxxiii. fig. 3.

Sub-class II—**CHONDROPTERYGII.**

Order I—HOLOCEPHALA.

Fam.: **CHIMÆRIDÆ.**

Chimæra monstrosa, Linn.

Chimæra monstrosa, *Linn. Mus. Ad. Frid.* i. p. 53, pl. 25.
Chimæra monstrosa, *Dumeril, Elasmobr.* p. 686, pl. 13. fig. 3 and 4, pl. 14. fig. 1. Cape of Good Hope.
Chimæra monstrosa, *Smitt, Scandinavian Fishes*, p. 1079, pl. xlvi. fig. 2 and 3.

Callorhynchus antarcticus, Lacep.
(Josup).

Chimæra antarctica, *Lacep.* p. 400, pl. 12. fig. 2.
Callorhynchus antarcticus, *Cuv. Regne. An.*
Callorhynchus capensis, *Dumeril, Elasmobr.* p. 695. Cape.
Callorhynchus capensis, *Blkr. Vische v.d. Kaap.* pp.
Callorhynchus capensis, *Gunth.* viii. p. 351. Cape of Good Hope.
Callorhynchus capensis, *Good and Bean, Ocean Ichth.* p. 36. fig. 32.

Order II—PLAGIOSTOMATA.

Fam.: **CARCHARIIDÆ.**

Carcharias acutus, Rupp.

Carcharias acutus, *Rupp. N.W. Fische.* p. 65, pl. 18. fig. 4.
Carcharias acutus, *Gunth.* viii. p. 358. Cape of Good Hope.

Carcharias melanopterus, Quoy & Gaim.

Carcharias melanopterus, *Quoy & Gaim. Voy. Uran. Zool.* p. 194, pl. 43. fig. 1 and 2.
Carcharias melanopterus, *Gunth.* viii. p. 369. South Africa.

Galeus canis, Bonap.

Galeus canis, *Bonap. Iconogr. Fns. Ital.* iii. Pesc. tab. 132. fig. 3.
Galeus canis (Rond.), *Blkr. Vische v.d. Kaap.* p. 58.
Galeus canis, *Gunth.* viii. p. 379. Cape Seas.
Galeorhinus galeus, *Smitt, Scandinavian Fishes.* p. 1132, pl. 4. fig. 2.

Leptocarcharias smithii, M. & H.

Triænodon smithii, *Mull & Henle,* p. 56, pl. 21.
Triænodon smithii, *Blkr. Vische v.d. Kaap.* p. 37.
Leptocarcharias smithii, *Gunth.* viii. p. 384. Cabenda Bay, South Africa (West A. ?).

Mustelus lævis, Risso.

Mustelus lævis, *Risso, Eur. Merid.* iii. p. 127.
Mustelus megalopterus, *Smith, Illustr. Zool. S. Africa,* pl. 2. Scarce at Cape Town.
Mustelus megalopterus, *Blkr. Vische v.d. Kaap.* p. 57.
? Mustelus natalensis, *Stndchnr. Sitz. Ak. Wiss. Wien.* 1866. liii. p. 482, pl. 1. Natal.
Mustelus natalensis, *Gunth.* viii. p. 385. Cape of Good Hope.

Mustelus vulgaris, M. & H.

Mustelus vulgaris, *Mull & Henle* (part), p. 64, p. 190, pl. 27. fig. 1.
Mustelus vulgaris, *Dumeril, Elasmobr.* p. 400, pl. 3. fig. 1-3 (teeth).
Mustelus vulgaris, *Blkr. Vische v.d. Kaap.* p. 57.

Fam.: LAMNIDÆ.

Lamna glauca, M. & H.

Lamna glauca, *Mull & Henle,* p. 69, pl. 29.
Lamna glauca, *Gunth.* viii. p. 391. Cape Seas.

Carcharodon rondeletii, M. & H.

Carcharodon rondeletii, *Mull. & Henle*, Plag. p. 70.
Carcharodon capensis, *Smith, Illustr. Zool. S. Africa*, pl. 4. Cape Seas.
Carcharodon capensis, *Blkr. Vische v.d. Kaap.* p. 58.
Carcharodon rondeletii, *Blkr. Vische v.d. Kaap.* p. 57.
Carcharodon rondeletii, *Gunth.* viii. p. 392. Cape Seas.

Odontaspis americanus, Mitch.

Squalus americanus, *Mitch. Phil. & Lit. Trans. New York*, i. p. 483.
Odontaspis taurus (Rafinesque), *Mull & Henle*, p. 73, pl. 30.
Odontaspis taurus, *Blkr. Vische v.d. Kaap.* p. 58.
Odontaspis americanus, *Gunth.* viii. p. 392. Cape Seas.

Alopecias vulpes, Gm.
(Thrasher).

Squalus vulpes, *Gm. L. Syst. Nat.* i. p. 1496.
Alopias vulpes, *Blkr. Vische v.d. Kaap.* p. 58.
Alopecias vulpes, *Gunth.* viii. p. 393. Cape Seas.

Fam.: **SCYLLIDÆ.**

Scyllium africanum, Gm.
(Lui-haai).

Squalus africanus, *Gm. L.* i. p. 1494.
Scyllium africanum, *Smith, Illustr. Zool. S. Africa*, pl. 25. fig. 1. Abounds in S. African Seas.
Scyllium variegatum, *Smith*, l.c. fig. 2. One only seen from Algoa Bay.
Scyllium pantherinum, *Smith*, l.c. fig. 3. Occasionally on E. Coast.
Scyllium africanum, *Gunth.* viii. p. 405. Cape Seas. Cape of Good Hope: Algoa Bay. (Sir A. Smith's specimens).

Scyllium edwardsii, Cuv.

Scyllium edwardsii, *Cuv. Regne. An.*
Scyllium edwardsii, *Mull & Henle*, p. 4, pl. 1.
Scyllium edwardsii, *Blkr. Vische v.d. Kaap.* p. 57.
Scyllium edwardsii, *Gunth.* viii. p. 401. Cape of Good Hope.

Scyllium bivium, M. & H.

Scyllium bivium (Smith), *Mull. & Henle*, p. 8.
Scyllium bivium, *Blkr. Vische v.d. Kaap.* p. 57.
Scyllium bivium, *Gunth.* viii. p. 405. Cape of Good Hope.

Scyllium capense, M. & H.

Scyllium capense (Smith), *Mull. & Henle*, p. 11.
Scyllium capense, *Blkr. Vische v.d. Kaap.* pp. 57. 79.
Scyllium capense, *Gunth.* viii. p. 404. Cape Seas. (Type.)
Scyllium capense, *Day, Fishes of India*, p. 724, pl. cxc. fig. 1.

Chiloscyllium indicum, Gm.

Squalus indicus, *Gm. L.* i. p. 1503.
Chiloscyllium plagiosum, *Mull. & Henle*, p. 17, and *Blkr. Vische v.d. Kaap.* p. 57.
Chiloscyllium tuberculatum, *Mull & Henle*, p. 19, and *Blkr. Vische v.d. Kaap.* p. 57.
Chiloscyllium indicur, *Gunth.* viii. p. 411. Cape Seas.

Fam.: RHINODONTIDÆ.

Rhinodon typicus, Smith.

Rhinodon typicus, *Smith, Illustr. Zool. S. Africa*, pl. 26. Only one seen within memory of fishermen at the Cape.
Rhinodon typicus, *Mull & Henle*, p. 77. tab. 35. fig. 2 (teeth).
Rhinodon typicus, *Blkr. Vische v.d. Kaap.* p. 58.
Rhinodon typicus, *Gunth.* viii. p. 396. Cape of Good Hope.

Fam.: NOTIDANIDÆ.

Notidanus indicus, Cuv.

Notidanus indicus, *Cuv. Regne An.*
Heptanchus indicus, *Mull. & Henle*, p. 82, pl. 32.
Heptanchus indicus, *Blkr. Vische v.d. Kaap.* p. 58.

Heptanchus indicus, *Macdonald & Barron, Proc. Zool. Soc.* 1868. p. 371, pl. 33.
Notidanus indicus, *Gunth.* viii. p. 399. Cape Seas.

Fam.: **SPINACIDÆ.**

Acanthias blainvillei, Risso.

Acanthias blainvillei, *Risso, Eur. Merid.* iii. p. 133, pl. 3. fig. 6.
Acanthias blainvillei, *Blkr. Vische v.d. Kaap.* p. 58.
Acanthias blainvillii, *Gunth.* viii. p. 419. Cape of Good Hope.

Echinorhinus spinosus, Gm.

Echinorhinus spinosus, *Gm. L.* i. p. 1500.
Echinorhinus obesus, *Smith, Illustr. Zool. S. Africa,* pl. 1.
Echinorhinus spinosus, *Mull. & Henle.* p. 96, pl. 60.
Echinorhinus spinosus, *Blkr. Vische v.d. Kaap.* p. 58.
Echinorhinus obesus, *Blkr. Vische v.d. Kaap.* p. 58.
Echinorhinus spinosus, *Gunth.* viii. p. 428. Cape of Good Hope.

Fam.: **PRISTIDÆ.**

Pristis pectinatus, Latham.

Pristis pectinatus, *Latham, Trans. Lin. Soc.* 1794. ii. p. 278, pl. 26. fig. 2 (rostrum).
Pristis pectinatus, *Bl. Schn.* p. 351, pl. 70. fig. 1.
Pristis pectinatus, *Blkr. Vische v.d. Kaap.* p. 58.
Pristis pectinatus, *Gunth.* viii. p. 437. Cape of Good Hope.

Fam.: **RHINOBATIDÆ.**

Rhinobatus obtusus, M. & H.

Rhinobatus obtusus, *Mull. & Henle,* p. 122, pl. 37. fig. 2.
Rhinobatus (Rhinobatus) obtusus, *Blkr. Vische v.d. Kaap.* p. 58.
Rhinobatus obtusus, *Gunth.* viii. p. 443.

Rhinobatus columnæ, M. & H.

(Zandkruiper).

Rhinobatus (Syrrhina) columnæ, *Mull. & Henle.* p. 113.
Rhinobatus annulatus, *Mull. & Henle.* p. 116.
Rhinobatus annulatus, *Smith, Illustr. Zool. S. Africa*, pl. 16. Kowie River; Algoa Bay. Not yet found westward of Cape Point, and is not known to fishermen in Simon's Town.
Rhinobatus annulatus, *Pappe, Synops.* p. 22. Zand Kruiper. Rather scarce in Table Bay.
Rhinobatus annulatus, *Blkr. Vische v.d. Kaap.* p. 58.
Rhinobatus annulatus, *Gunth.* viii. p. 446. Port Natal.
Rhinobatus annulatus, *Kner, Novara*, p. 416. Cape of Good Hope (?)

Rhinobatus blochii, M. & H.

Rhinobatus blochii, *Mull. & Henle*, p. 115, pl. 37. fig. 1.
Rhinobatus blochii, *Blkr. Vische v.d. Kaap.* p. 58.
Rhinobatus blochii, *Gunth.* viii. p. 447. Cape of Good Hope.

Fam.: **TORPEDINIDÆ.**

Torpedo marmorata, Risso.

Torpedo marmorata, *Risso, Ichth. Nice.* p. 20, pl. 3. fig. 4., or *Eur. Merid.* iii. p. 143. fig. 9.
Torpedo marmorata, *Gunth.* viii. p. 450. Port Natal.

Torpedo smithii, Gunth.

Torpedo smithii, *Gunth.* viii. p. 451. S. Africa?

Narcine brasiliensis, Olfers.

Torpedo brasiliensis, *Olfers, Torped.* p. 19. tab. 2. fig. 4.
Narcine brasiliensis, *Henle, Narcin.* p. 31. tab. 1. figs. 1 and 2.
Narcine brasiliensis, *Blkr. Vische v.d. Kaap.* p. 57.
Narcine brasiliensis, *Gunth.* viii. p. 453. Cape of Good Hope.

Astrape capensis, Gm.

(Drill-visch, Electric-fish).

Raja capensis, *Gm. L.* i. p. 1512; *Bl. Schn.* p. 360.
Narcine capensis, *Henle, Narcin.* p. 36, pl. 3. fig. 1.
Astrape capensis, *Mull. & Henle.* p. 130.
Astrape capensis, *Blkr. Vische. v.d. Kaap.* p. 58.
Astrape capensis, *Gunth.* viii. p. 454. Cape of Good Hope.
Astrape capensis, *Kner, Novara*, p. 419. Cape of Good Hope.

Fam.: **RAJIDÆ.**

Raja capenis, M. & H.

Raja capensis, *Mull. & Henle.* p. 151.
Raja capensis (Smith), *Blkr. Vische v.d. Kaap.* p. 58.
Raja capensis, *Dumeril, Elasmobr.* p. 540.
Raja capensis, *Kner, Novara*, p. 419. Cape of Good Hope.

Raja smithii, M. & H.

Raja smithii, *Mull. & Henle*, p. 150, pl. 48. fig. 1.
Raja smithii, *Blkr. Vische v.d. Kaap.* p. 58.
Raja smithii, *Gunth.* viii. p. 467. South Africa. (Type of species).

Raja maculata, Montag.

Raja maculata, *Montagu Werner Mem.* ii. p. 426.
Raja maculata, *Pappe, Synops.* p. 23.

Fam.: **TRYGONIDÆ.**

Trygon pastinaca, Linn.

(Pijl-staart. Sting Ray).

Raja pastinaca, *Linn. Syst. Nat.* i. p. 396.
Trygon pastinaca, *Dumeril, Elasmobr.* p. 600.
Trygon pastinaca, *Blkr. Vische v.d. Kaap.* p. 58.
Trygon pastinaca, *Gunth.* viii. p. 478. From Sir A. Smith (Cape?)
Trygon pastinaca, *Smitt, Scandinavian Fishes*, p. 1098, pl. 313, 314. Specimen in Paris Museum from Cape of Good Hope.

Trygon purpurea, M. & H.

Trygon purpurea, *Mull. & Henle.* p. 160. taf. 51. South Africa (known from a drawing).
Trygon purpurea (Smith), *Blkr. Vische v.d. Kaap.* p. 58.
Trygon purpurea, *Gunth.* viii. p. 472.

Trygon uarnak, Forsk.

Raja uarnak, *Forsk. Descr. Anim.* p. 18.
Pastinachus uarnak, *Rupp. N.W. Fische.* p. 69, pl. 19. figs. 20 and 22.
Trygon uarnak, *Blkr. Vische v.d. Kaap.* p. 58.

Fam.: MYLIOBATIDÆ.

Myliobatis aquila, Linn.

Myliobatis aquila, *Linn. Syst. Nat.* i. p. 396.
Myliobatis aquila, *Mull. & Henle.* p. 176.
Myliobatis aquila (Risso), *Blkr. Vische v.d. Kaap.* p. 59.
Myliobatis aquila, *Day, British Fishes,* ii. p. 353, pl. clxxvi.
Myliobatis aquila, *Smitt, Scandinavian Fishes,* p. 1095, pl. 311.

Sub-class III—CYCLOSTOMATA.

Fam.: MYXINIDÆ.

Bdellostoma cirrhatum, Forst.

Petromyzon cirrhatus (Forster), *Bl. Schn.* p. 532; *Forst. Descr. Anim. ed Licht.* p. 112.
Bdellostoma cirrhatum, *Gunth.* viii. p. 512. Table Bay.

ALPHABETICAL INDEX.

Abrostomus, 147.
Acanthias, 166.
Acanthistius, 105.
Acanthopterygii, 105.
Acanthostracion, 158.
Achirus, 145.
Acinacee, 124.
aculeatum (Plectropoma), 106.
acuminatus (Clinus), 133.
acus (Syngnathus), 156.
acutus (Carcharias), 162.
adscensionis (Trachinus), 106.
æquidens (Otolithus), 122.
afer (Barbus), 149.
afer (Capoeta), 149.
afer (Pagellus), 114.
africanum (Scyllium), 164.
africanus (Squalus), 164.
Agriopus, 119.
alalonga (Thynnus), 128.
Albula, 154.
Algoa, 144.
algœnsis (Chrysophrys), 113.
Alopecias, 164.
Alopias, 164.
altipinnis (Exocœtus), 152.
Ambassis, 108.
americanus (Odontaspis), 164.
americanus (Squalus), 164.
amia (Lichia), 126.
amia (Scomber), 126.
Anacanthini, 143.
andersonii (Chromys), 142.
Anguilla, 154.
anguillaris (Clinus), 133.
angulosus (Labrus), 121.
annularis (Nauclerus), 128.
annulatus (Rhinobatus), 167.
anoplus (Barbus), 150.
antarctica (Chimaera), 162.
antarcticus (Callorhynchus), 162.
Antennarius, 130.
antennatus (Chilomycterus), 159.
antennatus (Diodon), 159.
Anthias, 107, 108.
apiatus (Batrachus), 130.
aquila (Myliobatis), 169.
aquila (Sciæna), 122.
arcatus (Cirrhites), 118.
arcus (Acanthostracion), 158.
arcus (Ostracion), 158.
argentatus (Cristiceps), 134.
argentea (Datnia), 110.
argenteus (Chætodon), 126.
argenteus (Dules), 105.
argenteus (Porthmeus), 125.
argenteus (Psettus), 126.
argenteus (Therapon), 110.
argentimaculata (Novacula), 139.
argentimaculata (Xyrichthys), 139.
argyreus (Lepidopus), 124.
Argyropelecus, 151.
argyrozona (Dentex), 108.
armatus (Pagellus), 115.
Arnoglossus, 145.
arsius (Pseudorhombus), 145.
ascensionis (Epinephelus), 106.
Astrape, 168.
ater (Galeichthys), 147.
Atherina, 135.
Atherinidæ, 135.
Atimostoma, 129.
atinga (Diodon), 160.
atun (Scomber), 124.
atun (Thyrsites), 124.
Atyposoma, 106.
auratus (Carassius), 151.
auratus (Cyprinus), 151.
auratus (Monacanthus), 157.
auratus (Sparus), 111.
aureo-vittata (Seriola), 125.
axillaris (Cæsio), 110.

Bagrus, 146.
Balistes, 157.
Barbus, 148.
batarde (Acinacee), 124.
Batrachidæ, 130.
Batrachus, 130.
Bdellostoma, 169.

Belone, 152.
Berycidæ, 121.
bicatenatus (Julis), 140.
bicuspis (Ostracion), 158.
bifilum (Blennius), 135.
bimaculatus (Hemichromis), 142.
bivium (Scyllium), 165.
blacodes (Ophidium), 143.
blainvillei (Acanthias), 166.
blainvillii (Acanthias), 166.
bleekeri (Solea), 145.
Blenniidæ, 132.
Blennius, 119, 132, 134.
blochii (Cantharus), 110, 111.
blochii (Rhinobatus), 167.
blochii (Tetraodon), 160.
blochii (Tetrodon), 160.
Boops, 116.
boops (Anthias), 108.
boops (Priacanthus), 108.
Boopsoidea, 117.
Box, 116.
brachycephalus (Clinus), 133.
brachydactylus (Chilodactylus), 117.
Brama, 130.
brama (Cantharus), 110.
brama (Sparus), 111.
brasilianum (Plectropoma), 106.
brasilianus (Acanthistius), 106.
brasiliensis (Narcine), 167.
brasiliensis (Torpedo), 167.
breijeri (Barbus), 151.
breviceps (Atherina), 135.
brevis (Dentex), 109.
burchelli (Barbus), 148.
bynni (Barbus), 150.

cabrilla (Serranus), 107.
Cæsio, 110.
cafer (Labeo), 147.
caffer (Labeo), 147.
caffer (Pagrus), 114.
Callionymus, 132.
Callorhynchus, 162.
camperi (Scombresox), 152.
camptosienis (Mugil), 137.
canariensis (Pagellus), 115.
canis (Galeus), 163.
Cantharus, 110, 111.
capense (Atimostoma), 129.
capense (Scyllium), 165.
capensis (Abrostomus), 147.
capensis (Achirus), 145.
capensis (Anguilla), 154.
capensis (Arnoglossus), 145.
capensis (Astrape), 168.
capensis (Bagrus), 146.
capensis (Barbus), 148.
capensis (Belone), 152.
capensis (Blennius), 132.
capensis (Callorhynchus), 162.
capensis (Carcharodon), 164.
capensis (Charax), 117.
capensis (Cheilobarbus), 148.
capensis (Cirrhibarbis), 133.
capensis (Clarias), 146.
capensis (Clinus), 133.
capensis (Cubiceps), 129.
capensis (Cynoglossus), 144.
capensis (Dipterodon), 116.
capensis (Elops), 154.
capensis (Galaxias), 153.
capensis (Genypterus), 143.
capensis (Gobius), 132.
capensis (Gymnetrus), 138.
capensis (Heteromycterus), 145.
capensis (Hippocampus), 156.
capensis (Leptocephalus), 155.
capensis (Leptorhynchus), 154.
capensis (Lithognathus), 115.
capensis (Merluccius), 143.
capensis (Motella), 143.
capensis (Mugil), 135, 136.
capensis (Narcine), 168.
capensis (Pedalion), 158.
capensis (Pentaceros), 108.
capensis (Plagusia), 145.
capensis (Raja), 168.
capensis (Sargus), 113.
capensis (Scomber), 125, 127.
capensis (Scorpæna), 118.
capensis (Sebastes), 118.
capensis (Sebastichthys), 119.
capensis (Seriola), 125.
capensis (Spirobranchus), 138.
capensis (Stromateus), 129.
capensis (Trachurus), 125.
capensis (Trigla), 120.
capensis (Trulla), 144.
capensis (Umbrina), 121.
capensis (Xiphiurus), 143.
capensis (Zeus), 129.
capito (Blennius), 134.
capito (Mugil), 136.
Capœta, 149.
Carangidæ, 125.
Caranx, 125.
Carassius, 151.
Carcharias, 162.
Carchariidæ, 162.
Carcharodon, 164.
castaneus (Blennius), 134.
castelnaui (Cantharus), 111.
castelnaui (Pagrichthys), 117.
caudatus (Lepidopus), 124.
caudatus (Trichiuris), 124.
Centriscidæ, 137.
Centriscus, 137.
Centropristis, 107.
cepedianus (Lophotes), 139.

Cepola, 138.
cernium (Polyprion), 106.
cervinus (Charax), 113.
cervinus (Sargus), 113.
chabaudi (Serranus), 107.
Chætodon, 126, 139.
chapmani (Chromys), 142.
Charax, 113, 117.
Cheilodactylus, 118.
Chilodactylus, 117.
Chilomycterus, 159.
Chiloscyllium, 165.
Chimæra, 162.
Chimæridæ, 162.
chinoise (Sphyrene), 124.
chloropterus (Exocœtus), 153.
Chondropterygii, 162.
Chorisochismus, 138.
Chromichthys, 142.
Chromidæ, 140.
Chromidotilapia, 142.
Chromis, 140, 141.
Chromys, 140, 141, 142.
Chrysoblephus, 112.
Chrysophrys, 111, 114.
Cichlidæ, 140.
cingulata (Julis), 140.
cirrhatum (Bdellostoma), 169.
cirrhatus (Petromyzon), 169.
Cirrhibarbis, 133.
Cirrhites, 118.
Cirrhitidæ, 117.
cirrhosa (Sciæna), 121.
cirrhosa (Umbrina), 121.
Clarias, 118.
clathratus (Serranus), 106.
Clinus, 132.
Clupea, 153.
Clupeidæ, 153.
clypeata (Echeneis), 129.
Cobitis, 153.
columnæ (Rhinobatus), 167.
columnæ (Syrrhina), 167.
commersonii (Cybium), 128.
commersonii (Scomber), 128.
commersonii (Sphyræna), 124.
concatenatus (Ostracion), 158.
conidens (Temnodon), 126.
conorynchus (Albula), 154.
constantiæ (Mugil), 136.
conwayi (Hoplegnathus), 121.
cornutus (Blennius), 134.
cornutus (Ostracion), 158.
Corvina, 122.
Coryphæna, 129.
costatus (Callionymus), 132.
cottoides (Clinus), 133.
Cottus, 120.
Crayracion, 161.
Crenidens, 117.
crenilepis (Mugil), 137.
crinitus (Blennius), 134.
Cristiceps, 134.
cristiceps (Chrysophrys), 112.
Ctenochromis, 141.
Ctenopoma, 138.
Cubiceps, 129.
cultrata (Novacula), 139.
cultratus (Xyrichthys), 139.
curvidens (Gymnocrotaphus), 116.
cutaneus (Tetrodon), 160.
cuvieri (Serranus), 105.
Cybium, 128.
Cyclopterus, 138.
Cyclostomata, 169.
cynocephalus (Lophius), 130.
Cynoglossus, 144.
Cyprinidæ, 147.
Cyprinus, 151.

Datnia, 110.
delalandei (Anguilla), 155.
delalandei (Syngnathus), 156.
delalandi (Anguilla), 154.
delalandii (Anguilla), 155.
delalandi (Syngnathus), 156.
Dentex, 108, 114.
dentex (Chorisochismus), 138.
dentex (Cyclopterus), 138.
dentex (Gobiesox), 138.
dentex (Lepadogaster), 138.
depressirostris (Eutropius), 146.
dewaali (Gobius), 131.
diaphanus (Ostracion), 158.
Dicotylichthys, 159.
Diodon, 159.
Dipterodon, 116.
dorsalis (Clinus), 133.
draco (Trachinus), 121.
dubius (Clinus), 134.
ductor (Gasterosteus), 128.
ductor (Naucrates), 128
Dules, 105.
durbanensis (Sargus), 114.
dussumieri (Salarias), 135.

Echeneis, 128.
echinatus (Chilomycterus), 159.
echinatus (Holocanthus), 159.
Echinorhinus, 166.
edwardsii (Scyllium), 164.
elongatus (Cantharus), 111.
elongatus (Chromichthys), 142.
Eleps, 154.
emarginatus (Cantharus), 111.
encrasicholus (Engraulis), 154.
Engraulis, 154.
Epinephelus, 106.
erythrinus (Pagellus), 115.
erythrinus (Sparus), 115.
Esox, 152.
euronotus (Mugil), 135.

Eutropius, 146.
evolans (Exocœtus), 152.
Exocœtus, 152.

falciformis (Psettus), 127.
fascialis (Pagellus), 115.
fasciatus (Chilodactylus), 117.
fasciatus (Chromichthys), 142.
fasciatus (Hemichromis), 142.
fasciatus (Sargus), 113.
fasciolata (Coryphæna), 129.
fasciolatus (Lampugus), 129.
feliceps (Galeichthys), 146.
filamentosus (Dentex), 109.
filosus (Dentex), 109.
fiskii (Lophotes), 139.
flavo-brunneum (Cybium), 128.
flavo-cæruleus (Caranx), 125.
flavomarginata (Muræna), 155.
forskalii (Crenidens), 117.
forsteri (Cirrhites), 118.
forsteri (Grammistes), 118.
frederici (Chromidotilapia), 142.
frederici (Chromys), 142.
fronticinctus (Monacanthus), 157.
fuscus (Pimelepterus), 116.

Gadidæ, 143.
Gadus, 143.
Galaxias, 153.
Galaxiidæ, 153.
Galeichthys, 146.
Galeorhinus, 163.
Galeus, 163.
galeus (Galeorhinus), 163.
gariepinus (Clarias), 146.
gariepinus (Heterobranchus), 146.
gariepinus (Silurus), 146.
Gasterosteus, 119, 126, 128.
Gastrophysus, 160.
Genypterus, 143.
geometricus (Chilomycterus), 159.
geometricus (Diodon), 159.
Gerres, 140.
Gerridæ, 140.
gibbiceps (Chrysoblephus), 112.
gibbiceps (Chrysophrys), 112.
gigas (Epinephelus), 107.
gigas (Perca), 107.
gigas (Serranus), 107.
gilchristi (Gobius), 132.
giuris (Gobius), 131.
gladius (Cepola), 138.
gladius (Gymnetrus), 138.
gladius (Histiophorus), 123.
gladius (Regalecus), 138.
gladius (Scomber), 123.
gladius (Xiphias), 123.
glauca (Lamna), 163.
glauca (Lichia), 126.
glaucus (Lichia), 126.
glaucus (Scomber), 126.
glaycos (Lichia), 126.
globiceps (Chrysophrys), 111.
Glyphidodon, 139.
Glyphisodon, 139.
Gnathendelia, 149.
Gobiesocidæ, 138.
Gobiesox, 138.
Gobiidæ, 131.
gobionoides (Barbus), 149.
Gobius, 131.
Gonorhynchidæ, 153.
Gonorhynchus, 153.
Grammistes, 118.
grande (Pachymetopon), 116.
grandicornis (Blennius), 134.
grandis (Chilodactylus), 118.
granulifer (Histiophorus), 123.
grex (Scomber), 127.
greyi (Gonorhynchus), 153.
gronovii (Gonorhynchus), 153.
güntheri (Julis), 140.
gurneyi (Atyposoma), 106.
gurneyi (Barbus), 150.
guttatus (Hemichromis), 142.
gymnauchen (Gobius), 132.
Gymnetrus, 138.
Gymnocrotaphus, 116.
Gymnodontes, 158.
gyrinus (Gobiesox), 138.

hebraica (Julis), 140.
hebraica (Labrus), 140.
Hemichromis, 142.
Hemiramphus, 152.
hepatus (Centropristis), 107.
hepatus (Labrus), 107.
hepatus (Serranus), 107.
Heptanchus, 165.
herschelii (Histiophorus), 123.
Heterobranchus, 146.
heterodon (Clinus), 132.
Heteromycteris, 145.
Hippocampus, 156.
hippos (Caranx), 125.
hippos (Scomber), 125.
hippurus (Coryphæna), 129.
Histiophorus, 123.
Holocanthus, 159.
Holocentrum, 121.
Holocentrus, 107.
Holocephala, 162.
holodon (Engraulis), 154.
hololepidota (Sciæna), 122.
hololepidotus (Sciæna), 122.
holubi (Barbus), 148.
holubi (Chrysophrys), 113.
holubi (Pagrus), 113.
holubi (Sargus), 114.
honckenii (Gastrophysus), 160.
honckenii (Tetraodon), 160.

honckenii (Tetrodon), 160.
honkenii (Tetraodon), 160.
honkenyi (Tetraodon), 160.
Hoplegnathidæ, 121.
Hoplegnathus, 121.
Hoplophycis, 143.
hottentottus (Sargus), 113.
hystrix (Diodon), 160.

Ichthyoramphus, 121.
impar (Pegusa), 145.
indicum (Chiloscyllium), 165.
indicus (Heptanchus), 165.
indicus (Naucrates), 128.
indicus (Notidanus), 165.
indicus (Squalas), 165.
inornata (Boopsoidea), 117.
insidiator (Cottus), 120.
insidiator (Platycephalus), 120.

jarbua (Therapon), 110.
jarbua (Sciæna), 110.
jello (Sphyræna), 123.
johnii (Anthias), 108.
johnii (Mesoprion), 108.
Julis, 140.

Kuhlia, 105.
kumu (Trigla), 120.
kurumanni (Barbus), 151.

Labeo, 147.
labiata (Anguilla), 155.
Labridæ, 139.
Labrus, 107, 109, 121, 140.
Labyrinthici, 138.
lævigatus (Antennarius), 130.
lævis (Mustelus), 163.
lagocephalus (Tetrodon), 161.
lalandii (Hoplophycis), 143.
lalandii (Seriola), 125.
Lamna, 163.
Lamnidæ, 163.
Lampugus, 129.
lanceolatus (Epinephelus), 107.
lanceolatus (Holocentrus), 107.
laniarius (Chrysophrys), 112.
laniarius (Pagrus), 112, 114.
laticeps (Chrysophrys), 114.
laticeps (Pagrus), 114.
latipinnis (Clinus), 133.
lavaillanti (Chromys), 142.
layardi (Stromatoidea), 129.
Lepadogaster, 138.
Lepidopus, 124.
Leptocarcharias, 163.
Leptocephalus, 155.
Leptorhynchus, 154.
leucurus (Nauclerus), 128.
Lichia, 125, 126.
Lithognathus, 115.
lithognathus (Pagellus), 115.
livingstonii (Chromys), 142.
longicaudis (Cyprinus), 151.
longipinnis (Exocœtus), 152.
longirostris (Gerres), 140.
Lophius, 130.
Lophobranchii, 156.
Lophotes, 139.
Lophotidæ, 139.
lunaris (Tetrodon), 161.

macrocephala (Muræna), 155.
macrocephalus (Dentex), 109.
macrocephalus (Labrus), 109.
macrodens (Dentex), 109.
macrolepis (Mugil), 137.
maculata (Raja), 168.
maculatus (Balistes), 157.
maculatus (Diodon), 159.
maculatus (Sebastes), 119.
maculifer (Diodon), 160.
malo (Dules), 105.
malo (Kuhlia), 105.
marequensis (Barbus), 148.
marequensis (Cheilobarbus), 148.
marginata (Synaptura), 144.
marmorata (Torpedo), 167.
marmoratus (Antennarius), 130.
marmoratus (Clinus), 134.
megalopterus (Mustelus), 163.
melanopterus (Carcharias), 163.
Merluccius, 143.
merlucius (Gadus), 143.
Mesoprion, 108.
microlepidotum (Ctenopoma), 138.
microlepis (Synaptura), 144.
mitis (Balistes), 157.
moffati (Chromys), 141.
moffati (Paratilapia), 141.
mola (Orthagoriscus), 158.
mola (Tetrodon), 158.
Monacanthus, 157.
monstrosa (Chimæra), 162.
morisii (Leptocephalus). 155.
mormyrus (Pagellus), 115.
mormyrus (Pagrus), 115.
mormyrus (Sparus), 115.
Moronopsis, 105.
mossambicus (Chromis), 141.
motebensis (Barbus), 150.
Motella, 143.
Mugil, 135.
Mugilidæ, 135.
multidentatus (Agriopus). 120.
multilineatus (Mugil), 136.
multimaculatus (Barbus), 149.
multiradiatus (Cheilodactylus), 118.
Muræna, 154, 155.
Murænoides, 143.
Mustelus, 163.
Myliobatidæ, 169.
Myliobatis, 169.

Myxinidæ, 169.

Narcine, 167, 168.
nasutus (Chrysophrys), 112.
natalensis (Barbus), 151.
natalensis (Belone), 152.
natalensis (Chromis), 141.
natalensis (Chrysophrys), 112.
natalensis (Mugil), 137.
natalensis (Mustelus), 163.
natalensis (Tilapia), 141.
Nauclerus, 128.
Naucrates, 128.
nebulosa (Muræna), 155.
n'gamensis (Chromys), 142.
nilotica (Tilapia), 141.
niloticus (Chromis), 140, 141.
Notidanidæ, 165.
Notidanus, 165.
Novacula, 139.
novemcinctus (Serranus), 107.
nudiceps (Gobius), 131, 132.
nudus (Chorisochismus), 138.

obesus (Echinorhinus), 166.
obesus (Hemiramphus, 152.
oblongus (Orthagoriscus), 159.
obtusus (Rhinobatus), 166.
ocellata (Clupea), 153.
Odontaspis, 164.
olfersii (Argyropelecus), 151.
olfersii (Sternoptyx), 151.
olivaceus (Gobius), 131.
operculare (Pristipoma), 110.
Ophichthys, 154.
Ophidium, 143.
Ophisurus, 154.
orbicularis (Chilomycterus), 159.
orbicularis (Diodon), 159.
Orthagoriscus, 158.
Ostracion, 158.
Otolithus, 122.

Pachymetopon, 116.
Pagellus, 114, 115.
Pagrichthys, 117.
Pagrus, 112, 113, 114, 115.
pallidus (Barbus), 149.
paludinosus (Barbus), 148.
pantherinum (Scyllium), 164.
pantherinus (Cirrhites), 118.
pantherinus (Clinus), 134.
pantherinus (Sparus), 118.
pappei (Ichthyoramphus), 121.
pappei (Lichia), 125.
Parascorpis, 106.
paraspistes (Caranx), 125.
Paratilapia, 141.
pardalis (Monacanthus), 157.
parvipinnis (Atherina), 135.
pastinaca (Raja), 168.
pastinaca (Trygon), 168.
Pastinachus, 169.
pectinatus (Pristis), 166.
pectoralis (Synaptura), 144.
Pedalion, 158.
Pediculati, 130.
Pegusa, 145.
pelagicus (Syngnathus), 156.
Pelamys, 128.
pelamys (Scomber), 127.
pelamys (Thynnus), 127.
Pentaceros, 108.
Perca, 106, 107.
Percidæ, 105.
peronii (Trigla), 120.
Petromyzon, 169.
philander (Chromis), 141.
philander (Ctenochromis), 141.
philander (Tilapia), 141.
phlegon (Syngnathus), 156.
Physostomi, 146.
Pimelepterus, 116.
piscatorius (Lophius), 130.
Plagiostomata, 162.
plagiosum (Chiloscyllium), 165.
Plagusia, 145.
Platycephalus, 120.
platynotus (Gobius), 132.
Plectognathi, 157.
Plectropoma, 106.
Pleuronectes, 144.
Pleuronectidæ, 144.
pneumatophorus (Scomber), 127.
Pœcilophis, 155.
Polyprion, 106.
Pomacentridæ, 139.
Porthmeus, 125.
præorbitalis (Dentex), 109.
Priacanthus, 108.
Prionotus, 120.
Pristidæ, 166.
Pristis, 166.
Pristipoma, 110.
Pristipomatidæ, 108.
prognatha (Perca), 106.
prognathus (Polyprion), 106.
Psettus, 126.
Pseudorhombus, 145.
Pterois, 119.
punctata (Corvina), 122.
punctulatus (Dicotylichthys), 159.
Puntius, 149.
purpurea (Trygon), 169.
pusillus (Prionotus), 120.

radians (Mugil), 137.
raii (Brama), 130.
Raja, 168.
Rajidæ, 168.
ranina (Antennarius), 130.
Regalecus, 138.

remora (Echeneis), 128.
Rhinobatidæ, 166.
Rhinobatus, 166.
Rhinodon, 165.
Rhinodontidæ, 165.
Rhypticus, 107.
richardsonii (Mugil), 136.
richardsonii (Pentaceros), 108.
rondeletii (Carcharodon), 164.
rondeletii (Sargus), 113.
rondeletii (Scombresox), 152.
rubescens (Blennius), 132.
rupestris (Dentex), 109, 114.
russellii (Pseudorhombus), 145.

Salarias, 135.
saliens (Mugil), 136.
salmonoides (Serranus), 107.
salpa (Boops), 116.
salpa (Box), 116.
salpa (Sparus), 116.
saltator (Temnodon), 126.
saltatrix (Gasterosteus), 126.
sammara (Holocentrum), 121.
sammara (Sciæna), 121.
sandvicensis (Moronopsis), 105.
saponaceus (Anthias), 107.
saponaceus (Rhypticus), 107.
sarda (Pelamys), 128.
sarda (Scomber), 128.
Sargus, 113.
saurus (Elops), 154.
saurus (Esox), 152.
saurus (Scombresox), 152.
Sciæna, 110, 121, 122.
Sciænidæ, 121.
Sclerodermi, 157.
scolopax (Centriscus), 137.
Scomber, 123, 124, 125, 126, 127, 128.
scomber (Scomber), 127.
Scombresocidæ, 152.
Scombresox, 152.
Scombridæ, 127.
scombrus (Scomber), 127.
Scorpæna, 118.
Scyllidæ, 164.
Scyllium, 164.
Sebastes, 118.
Sebastichthys, 119.
sebastoides (Acanthistius), 105.
sebastoides (Plectropoma), 106.
sebastoides (Serranus), 105.
Selar, 125.
Seriola, 125.
serpens (Muræna), 154.
serpens (Ophichthys), 154.
serpens (Ophisurus), 154.
serra (Barbus), 149.
Serranus, 105, 106, 107.
servus (Therapon), 110.
setifer (Monacanthus), 157.
sexmaculatus (Diodon), 159.
sicheli (Labeo), 147.
Siluridæ, 146.
Silurus, 146.
smithii (Chromys), 142.
smithii (Leptocarcharias), 163.
smithii (Mugil), 136, 137.
smithii (Raja), 168.
smithii (Torpedo), 167.
smithii (Triænodon), 163.
Solea, 144, 145.
sordidus (Chætodon), 139.
sordidus (Glyphidodon), 139.
sordidus (Glyphisodon), 139.
Sparidæ, 111.
sparrmanni (Chromis), 140.
sparrmanni (Chromys), 140, 142.
sparrmanni (Tilapia), 140.
Sparus, 111, 115, 116, 118.
spectabilis (Gobius), 131.
Sphyræna, 123.
Sphyrænidæ, 123.
Sphyrene, 124.
Spinacidæ, 166.
spinifer (Agriopus), 119.
spinosissimus (Diodon), 160.
spinosus (Echinorhinus), 166.
Spirobranchus, 138.
Squalus, 164, 165.
stellatus (Crayracion), 161.
stellatus (Tetrodon), 161.
Sternopthchidæ, 151.
Sternoptyx, 151.
striatus (Holocentrus), 107.
Stromateus, 129.
Stromatoidea, 129.
suillum (Pristipoma), 110.
superciliosus (Blennius), 132.
superciliosus (Clinus), 132.
Synaptura, 144.
Syngnathidæ, 156.
Syngnathus, 156.
Syrrhina, 167.

tæniops (Epinephelus), 106.
tæniops (Serranus), 106.
tæniura (Kuhlia), 105.
tæniurus (Dules), 105.
taurus (Odontaspis), 164.
tauvina (Epinephelus), 107.
tauvina (Perca), 107.
Teleostei, 105.
temminckii (Syngnathus), 156.
Temnodon, 126.
Tetraodon, 160.
Tetrodon, 158, 160.
theodoræ (Clarias), 146.
Therapon, 110.
theraps (Therapon), 110.
thunbergii (Chromys), 142.
thunbergii (Paratilapia), 142.

Thynnus, 127.
Thyrsites, 124.
Tilapia, 140.
Torpedinidæ, 167.
Torpedo, 167.
torvus (Agriopus), 119.
torvus (Blennius), 119.
Trachinus, 106, 121.
Trachurus, 125.
trachurus (Caranx), 125.
trachurus (Selar), 125.
trachurus (Trachurus), 125.
Trachypteridæ, 138.
Triænodon, 163.
Trichiuridæ, 124.
Trichiurus, 124.
Trigla, 120.
Triglidæ, 118.
trilobata (Julis), 140.
trilobatus (Labrus), 140.
trimaculatus (Barbus), 150.
trimaculatus (Serranus), 106.
Trulla, 144.
truncatus (Orthagoriscus), 159.
Trygon, 168.
Trygonidæ, 168.
tuberculatum (Chiloscyllium), 165.
typicus (Rhinodon), 165.
typus (Parascorpis), 106.

uarnak (Pastinachus), 169.
uarnak (Raja), 169.
uarnak (Trygon), 169.
umbratus (Abrostomus), 147.
Umbrina, 121.
undecim-aculeatus (Ostracion), 158.
unicolor (Chrysophrys), 114.
unicolor (Pagrus), 114.
unimaculatus (Mesoprion), 108.
unitæniatus (Barbus), 149.
upsicephalus (Lophius), 130.
urotænia (Ambassis), 108.

variegata (Pœcilophis), 155.
variegatum (Scyllium), 164.
verrucosus (Agriopus), 119.
versicolor (Blennius), 132.
vetula (Balistes), 157.
viridis (Algoa), 144.
vittatus (Puntius), 149.
viviparus (Barbus), 150.
volitans (Gasterosteus), 119.
volitans (Pterois), 119.
vomerinus (Lophius), 130.
vulgaris (Carassius), 151.
vulgaris (Merluccius), 143.
vulgaris (Mustelus), 163.
vulgaris (Solea), 144, 145.
vulgaris (Sphyræna), 124.
vulnerata (Gnathendelia), 149.
vulpes (Alopecias), 164.
vulpes (Alopias), 164.
vulpes (Squalus), 164.

Xiphias, 123.
Xiphiidæ, 123.
Xiphiurus, 143.
Xyrichthys, 139.

zebra (Pleuronectes), 144.
zebra (Synaptura), 144.
zebrata (Cobitis), 153.
zebrina (Solea), 144.
Zeus, 129.

LOCAL NAMES.

Albacore, 125
Anchovy, 154.
Baardmann, 122.
Bafaro, 106.
Bagger, 146.
Bamboo Fish, 116.
Barbel, 146.
Bastard Hottentot, 113.
Blaasop, 160.
Black Bagger, 147.
Cape Salmon, 122, 154.
Dageraad, 109, 112.
Dasje, 113.
Dik-kop, 131.
Drill-visch, 168.
Electric-fish, 168.
Elft, 126.
Fishing Frog, 130.
Galjoen, 116.
Geelbeck, 122.
Geelstaart, 125.
Gold-fish, 151.

Harder, 135, 136, 137.
Herring, 153.
Hottentot, 111.
Jacopiver, 118.
John Brown, 116.
Josup, 162.
Kabeljaauw, 122.
Kalk-visch, 124.
Katunker, 127.
King Klip-fish, 143.
Klip-visch, 132.
Knoorhaan, 120.
Leer-visch, 126.
Lootsmann, 128.
Lui-haai, 164.
Maasbanker, 125.
Mackerel, 127.
Makreel, 127.
Paarde-visch, 119.
Padda, 130.
Panga, 109, 114.
Papegaai-visch, 121.
Pijl-staart, 168.
Red Steenbras, 109, 114.
Red Stumpnose, 112.
Roman, 112.
Sancord, 119.
Sardijn, 153.
Seventy-four, 109.
Silver-fish, 108.
Slangetje, 133.
Snoek, 124.
Sole, 144.
Spiering, 135.
Springer, 136.
Steenbras, 115.
Steenbras, Red, 114.
Steenje, 111.
Steenklipvisch, 117.
Sting Ray, 168.
Stock-fish, 143.
Stumpnose, Red, 112.
Stumpnose, White, 111.
Sucker-fish, 128.
Thrasher, 164.
Tong, 144.
White Stumpnose, 111.
Wilde-paard, 113.
Windtoy, 110.
Zandkruiper, 167.
Zee Basje, 115.

[Published 27th February, 1902.]

OBSERVATIONS ON THE TEMPERATURE AND SALINITY OF THE SEA AROUND THE CAPE PENINSULA.

By J. D. F. GILCHRIST, M.A., B.Sc., Ph.D.

It has been known for some time that the Cape of Good Hope presents many interesting problems with regard to the physical condition of the sea in its neighbourhood. It is the meeting place of two great ocean currents, the warm equatorial current from the Indian Ocean, (known on the East coast as the Mozambique current, on the South as the Agulhas current,) and the cold Antarctic drift current. These encounter each other not far from the Cape Peninsula; the greater portion of the Agulhas current being turned back again into the Indian Ocean, while a portion, as shall be shown, escapes round the Cape Peninsula and proceeds up the West coast. The Antarctic drift current is also split into two branches as it encounters the projecting continent of South Africa and into the fork so formed flows the warm equatorial current.

This phenomenon is exhibited at each of the three great continents projecting into the Southern Ocean, viz.:—South America, South Africa and Australia, but in neither of the others is it so well marked as in the second.

The following observations are a contribution to our knowledge of the phenomena associated with the meeting-place of the great currents at the Cape Peninsula. It consists of four separate series of observations, but these are more or less connected with each other. They are:—First, a series of observations, made in March and April, 1900, by the Government steamer *Pieter Faure*, of temperatures at the surface and at about every ten fathoms, on a survey to the West of the Peninsula, water samples being at the same time collected and the amount of chlorine in grains per gallon determined in the laboratory. In addition to these, obser vations of surface temperatures were made on the 3rd March, 1898, and 11th-18th February, 1898, at intervals of about 5 miles, to a distance of 50 miles West of Cape Town, and on a voyage to St. Helena Bay. Second, daily records of air and sea temperatures taken at Robben Island in Table Bay, and at Roman Rock in Simon's Bay for a period of three years (1898, 1899 and 1900). Third, temperature observations and analyses of water samples taken at intervals on passages of the Government trawler between Table Bay and Simon's Bay, and of mail steamers between Table Bay and Cape Hangklip.

All these are parts only of a more extended scheme of observations now being carried out for the whole of the South African coast, and are brought together here in the hope that they may throw some light on the hydrographical phenomena in the particular region under considerotion

I. Observations West and North of the Cape Peninsula.

The various stations at which observations were taken are shown on Plates I and II. Stations I-V were visited on 5th-9th March, 1900. On the 13th, Station V was repeated and some considerable changes were noted, there being a rise in surface temperature of 2°·1 and a fall in bottom temperature (155 fms.), of 2°. The difference being probably connected with the direction of the wind, which was from the N.W. on the first visit, there being no wind on the second visit. The vessel then proceeded to Station VI, about 50 miles from land, and thence returned, taking serial temperatures at about every 10 miles. On the 27th, Station XII was repeated, and on the 29th another line of observations was run out to 70 miles from land to Station XVI to the South of the former. On the 17th April a return line was run to Cape Point.

The following tables give the results of these observations together with the meteorological conditions at the time :—

*Station I.

Position : Green Point Light House, S. ¼ W., 2½ miles.
Date : 5th March, 1900, 7·40 a.m.
Wind : Direction, N. by W. Force, 1. Weather, overcast.
Thermometer : Dry bulb, 61°. Wet bulb, 58°·7.
Barometer : 29·78. Depth, 22 fms. Bottom, rock.

Fms.	Temp. °	Chlorine in grains per gallon.
0	57·0	1384·5
10	52·2	1384·5
21	50·3	1384·5

Station II.

Position : Lion's Head, S.E. ¼ S., 10¾ miles.
Date : 6th March, 1900, 9·20 a.m.
Wind : Direction, S.E. Force, 0·5. Weather, haze on land.
Thermometer : Dry bulb, 66°. Wet bulb, 62°.
Barometer : 29·98. Depth, 69 fms. Bottom, rock.

Fms.	Temp. °	Chlorine in grains per gallon.
0	58·9	1384·5
10	52·6	
20	49·4	
28	49·5	
34	47·8	1397·0
38	48·3	
48	47·2	
58	47·0	
68	49·4 (?)	1379·5

Note.—*The positions and wind directions are magnetic; degrees throughout are given according to Fahrenheit scale, and the barometer readings are direct from Aneroid.*

Station III.

Position : Lion's Head, S.E., 22 miles.
Date : 6th March, 1900, 2·10 p.m.
Wind : Direction W.N.W. Force, 1. Weather, clear.
Thermometer : Dry bulb, 72°·3. Wet bulb, 66°·5.
Barometer, 29·87. Depth, 95 fms. Bottom —.

Fms.	Temp. °	Chlorine in grains per gallon.
0	58·0	1389·5
5	56·3	
10	54·3	
14	52 6	
24	49·7	
34	49·0	
44	47·0	1384·5
64	47·7	
84	47·2	
94	47·2	1377·0

Station IV.

Position : Lion's Head, S.E. $\frac{1}{4}$ E., 32 miles.
Date : 8th March, 1900, 1·50 p.m.
Wind : Direction, S.S.W. Force, 2. Weather, hazy.
Thermometer : Dry bulb, 68°. Wet bulb, 64°·5.
Barometer : 29·81. Depth, 126 fms. Bottom, greenish sand.

Fms.	Temp. °	Chlorine in grains per gallon.
0	59·2	1397·0
10	58·0	
20	54·0	
30	61·0 (?)	
40	54·1	
50	50·5	
60	48 4	
63	48·5	1379·5
70	48·5	
80	46·8	
90	46·3	
100	46·2	
125	46 3	1377·0

Station V.

Position : Lion's Head, S.E. $\frac{1}{2}$ E., 42 miles.
Date : 9th March, 1900, 11·5 a.m.

Wind : Direction, N.W. Force, 0 5. Weather, cloudy ; hazy land.
Thermometer : Dry bulb, 70°·7. Wet bulb, 66°·9.
Barometer : 29·89. Depth, 156 fms. Bottom, fine green sand.

Fms.	Temp. °	Chlorine in grains per gallon.
0	61·9	1397·0
5	61·1	
10	58·8	
20	54·8	
30	52·0	
40	51·3	
50	51·4	
60	50·0	
70	49·4	
80	49·1	
90	47·9	
100	47·5	
150	45·0	
155	45 0	1389·5

STATION V. (*repeated*).

Position : Lion's Head, S.E. ½ E., 42 miles.
Date : 13th March, 1900, 11 a.m.
Wind : Nil. Weather, cloudy.
Thermometer : Dry bulb, 68°·8. Wet bulb, 64°·2.
Barometer : 29 93. Depth, 156 fms. Bottom, fine green sand

Fms.	Temp. °	Chlorine in grains per gallon.
0	64·0	392·0
5	61·3	
10	58·9	
20	52·5	
30	51·4	
40	50·7	
50	50·2	
60	49·2	
70	48·0	1382·0
80	46·6	
90	45·9	
100	45·2	
110	44·7	
120	44·2	
130	44·0	
140	43·8	
155	43·3	
155	43.0	1377 0

Station VI.

Position : Table Mountain, S. 57° E., 57 miles.
Date : 14th March, 1900, 12·10 p.m.
Wind : Direction, S.W. Force, 3. Weather, sunshine and cloud.
Thermometer : Dry bulb, 72°·0. Wet bulb, 64°·9.
Barometer : 30·05. Depth, 381 fms. Bottom —

Fms.	Temp. °	Chlorine in grains per gallon.
0	69·5	1412·0
5	69·0	
7	69·0	
10	65·8	
12	65·3	
15	59·5	
20	58·3	
30	56·2	
40	55·1	
50	53·5	
60	51·6	
70	51·2	
80	50·6	
90	50·0	
100	48·7	
120	47·2	
140	46·1	
160	45·9	
180	45·1	
200	44·2	1377·0
220	43·9	
240	42·6	
260	41·7	
280	42·0	
300	41·0	
320	40·3	
340	40·1	
360	40·0	
380	40·0	1367·0

Station VII.

Position : Lion's Head, S. 72°E., 47 miles.
Date : 15th March, 1900, 2·20 p.m.
Wind : Direction, S.S.W. Force, 4. Weather, clear.
Thermometer : Dry bulb, 71°·6. Wet bulb, 63°·2.
Barometer : 30·09. Depth, 190 fms. Bottom, green sand.

Fms.	Temp. °	Chlorine in grains per gallon.
0	69·9	1414·5
10	69·9	
15	68·5	
17	67·2	
18	65·0	
19	63·7	
20	62·0	
30	59·9	
40	56·2	
50	54·3	
60	54·5	
70	53 5	
80	50·9	
90	50·8	
100	50·7	1402·0
110	49·9	
120	49·3	
130	48·9	
140	48·0	
150	46·8	
160	45·9	
170	46·7	
180	45·1	
190	45·0	1402·0

Station VIII.

Position : Lion's Head, E. by S. ¼ S., 37 miles.
Date : 16th March, 1900, 2 p.m.
Wind : Direction, S. Force, 6. Weather, clear.
Thermometer : Dry bulb, 71°·9. Wet bulb, 66°.
Barometer : 30·00. Depth : 171 fms. Bottom : —

Fms.	Temp. °	Chlorine in grains per gallon.
0	69·1	1419·5
10	69·1	
20	67·6	
23	66·8	
25	63·9	
30	60·9	
40	58·5	
50	57·3	
60	55·8	
70	54·3	
80	53·3	

Fms.	Temp. °	Chlorine in grains per gallon.
90	52·9	1399·5
100	50·7	
110	50·7	
120	49·2	
130	48·9	
140	47·9	
150	48·0	
160	47·0	
170	45·5	1389·5

Station IX.

Position: Lion's Head, S. 82° E., 27 miles.
Date: 21st March, 1900, noon.
Wind: Direction, N.E. Force, 1. Weather, cloudy.
Thermometer: Dry bulb, 63°·3. Wet bulb, 60°·2.
Barometer, 30·07. Depth 125 fms. Bottom, green sand.

Fms.	Temp. °	Chlorine in grains per gallon.
0	61·0	1404·5
10	59·7	
20	56·5	
23	56·7	
24	56·3	
25	56·1	
30	51·5	
40	50·0	
50	48·0	
60	47·8	1389·5
70	46·7	
80	46·7	
90	46·3	
100	46·0	
110	43·5	
120	42·4	1389·5

Station X.

Position: Lion's Head, E., 18 miles.
Date: 22nd March, 1900, 10 a.m.
Wind: Nil. Weather, fine; hazy on land.
Thermometer: Dry bulb. 67°·2. Wet bulb, 65°·0.
Barometer: 29·88. Depth, 104 fms. Bottom, black specks.

Fms.	Temp. °	Chlorine in grains per gallon.
0	59·6	1399·5
3	58·9	
5	57·0	
8	53·8	
10	52·8	
15	51·9	
20	51·2	
30	50·0	
40	48·7	
50	48·0	1387·0
60	47·0	
70	45·8	
80	45·7	
90	45·0	
100	44·2	1384·5

Station XI.

Position: Chapman's Pt., S. 45° E.; Slang Kop Pt., S. 10° W.
Date: 22nd March, 1900, 4·20 p.m.
Wind: Nil. Weather, clear.
Thermometer: Dry bulb, 74°·8. Wet bulb, 71°·8.
Barometer: 29·95. Depth, 41 fms. Bottom, fine light sand.

Fms.	Temp. °	Chlorine in grains per gallon.
0	62·2	1402·0
2	61·0	
5	58·2	
10	51·3	
20	48·8	1384·5
30	47·4	
40	47·2	1384·5

Station XII.

Position: Chapman's Pt., N. 56° E.; Vasco de Gama, S. 29° E.
Date: 23rd March, 1900, 11·45 a.m.
Wind: Direction, S. Force, 5. Weather, sunshine and cloud.
Thermometer: Dry bulb, 69°·0. Wet bulb, 62°·0.
Barometer: 30·02. Depth, 52 fms. Bottom, sand and rock.

Fms.	Temp. °	Chlorine in grains per gallon.
0	64·3	1409·5.
10	60·4	
20	49·8	
25	48·0	1387·0
30	47·6	
40	47·2	
50	47·0	1384·5

Station XII. (*repeated*).

Position : Chapman's Pt., N. 56° E., Vasco de Gama, S. 29° E.
Date : 27th March, 1900, 1·15 p.m.
Wind : Direction, S. by W. Force, 2. Weather, clear.
Thermometer : Dry bulb, 69°·3. Wet bulb, 64°·6.
Barometer : 30·02. Depth, 52 fms. Bottom, sand and rock.

Fms.	Temp. °	Chlorine in grains per gallon.
0	60·0	
3	59·6	
7	57·0	
10	56·4	
15	54·1	
20	53·1	
30	52·3	
40	49·8	
50	48·0	

Station XIII.

Position : Lion's Head, N. 67° E., 25 miles.
Date : 27th March, 1900, 3·30 p.m.
Wind : Direction, S. by W. Force, 3.
Thermometer : Dry bulb, 72°·5. Wet bulb, 68°·0.
Barometer : 30·00. Depth, 131 fms. Bottom, black specks.

Fms.	Temp. °	Chlorine in grains per gallon.
0	59·7	1399·5
5	59 0	
10	58·1	
15	57·7	
20	55·1	
23	55·1	
25	52·3	

Fms.	Temp. °	Chlorine in grains per gallon.
30	51·7	
40	50·0	
50	49·3	
60	47·9	
70	47·5	1389·5
80	47·1	
90	46·6	
100	45·7	
110	44·9	
120	44 8	
130	44·9	1387·0

Station XIV.

Position : Lion's Head, E. ¾ N., 32 miles.
Date : 29th March, 1900, 10·50 a.m.
Wind : Nil. Weather, cloudy.
Thermometer : Dry bulb, 68°·0. Wet bulb, 65°·0.
Barometer : 29·95. Depth, 175 fms. Bottom, fine sand and black specks.

Fms.	Temp. °	Chloride in grains per gallon.
0	66·1	1407·0
5	65·9	
10	65·3	
12	65·3	
13	64·7	
15	63·5	
18	63·0	
20	61·1	
25	60·2	
30	59·1	
35	56·3	
40	55·5	
50	53·0	
60	51·5	
70	49·8	
80	49·0	
90	48·7	1409·5
100	48·3	
110	47·7	
130	46·3	
150	45·4	
170	44·0	
175	44·0	1382·0

Station XV.

Position: Lion's Head, E., 40½ miles.
Date: 29th March, 1900, 3·40 p.m.
Wind Direction, N.W. Force, 2. Weather, sunshine and clouds.
Thermometer: Dry bulb, 68°·9. Wet bulb, 66°·2.
Barometer: 29·93. Depth, $\dot{\bar{3}}$80 fms.*

Fms.	Temp. °	Chlorine in grains per gallon.
0	66·6	1419·5
10	66·3	
20	66·3	
30	64·8	
40	60·2	
50	56·7	
60	54·0	
70	53·3	
80	53·1	
90	52·7	
100	53·0	1402·0
120	52·2	
140	51·1	
160	50·0	
180	47·3	
200	45·8	
250	42·9	1374·5
300	41·7	
330	41·5	
380	41·7	

Station XVI.

Position: Lion's Head, E. by S. ¼ S., 75 miles.
Date: 30th March, 1900, 6·40 a.m.
Wind: Direction, W. Force, 1. Weather, dull and cloudy.
Thermometer: Dry bulb, 66°·0. Wet bulb, 63°·8.
Barometer: 29·87. Depth, $\dot{\bar{3}}$80 fms.

Fms.	Temp. °	Chlorine in grains per gallon.
0	66·9	1419·5
10	66·9	
20	66·9	
30	66·8	
35	63·9	
40	62·0	
50	60·0	

* *The symbol $\dot{-}$ means that the lead did not touch bottom at this depth.*

Fms.	Temp. °	Chlorine in grains per gallon.
60	58·2	
70	56·8	
80	55·0	
90	54 4	
100	54·2	
120	54·2	
140	53·5	
160	52·2	
180	51·5	
200	50·6	
230	48·3	
250	46·7	
300	42·9	
330	42·0	
380	41·0	

Station XVII.

Position: Table Mountain, S. 83° E., 64 miles.
Date: 17th April, 1900, 1 p.m.
Wind: Direction S.W. Force, 1. Weather, clear.
Thermometer: Dry bulb, 74°·2. Wet bulb, 67°·4.

Barometer 30·02. Depth: 280 fms.

Fms.	Temp. °	Chlorine in grains per gallon.
0	67·3	14/ 1·5
5	66·8	
10	66·4	
15	63·8	
20	62·9	
25	60·6	
30	57·7	
40	56·1	
50	55·2	
60	53·8	
70	53·1	
80	52 0	
90	50·5	
100	50·4	1409·5
120	49·5	
140	48·0	
160	47·0	
180	47 0	
200	45·8	
250	42·2	
280	41·5	1407·0

Station XVIII.

Position: Table Mountain, N. 87° E., 48 miles.
Date: 18th April, 1900, 9·20 a.m.
Wind: Direction, S. by E. Force, 2. Weather, clear.
Thermometer: Dry bulb, 68·2°. Wet bulb, 64°·5.
Barometer: 29·96. Depth, 280 fms.

Fms.	Temp. °	Chlorine in grains per gallon.
0	67·3	1412·0
10	67 2	
20	66·5	
23	65·8	
27	62·2	
30	57·8	
40	56·1	
50	54·3	
60	53·9	
70	53·0	
80	52·0	
100	50·4	
120	49·0	1409·5
140	48·3	
160	46·6	
180	45·5	
200	44·8	
250	43·9	
280	43·7	1387·0

Station XIX.

Position: Table Mountain N. 79° E. 41 miles.
Date: 18th April, 1900. 1·30 p.m.
Wind: Direction S. Force 2. Weather clear.
Thermometer: Dry bulb, 70°·8. Wet bulb, 66°·0.
Barometer: 29·99. Depth 250 fms. Bottom green sand.

Fms.	Temp. °	Chlorine in grains per gallon.
0	67·3	1417·0
5	67·1	
10	66·9	
12	63·6	
14	62·6	
15	62·5	
20	62·0	
25	60·8	

Fms.	Temp. °	Chlorine in grains per gallon.
30	59·1	
40	57·0	
50	54·0	
60	54·0	
70	52·7	
80	52·5	
90	51·4	
100	51·4	1389·5
120	51·0	
140	49·1	
160	47·9	
180	47·2	
200	46·8	
250	44·3	1409·5

Station XX.

Position : Lion's Head N. 63° E. 34 miles.
Date : 19th April, 1900, 8·40 a.m.
Wind : Direction, S.S.E. Force, 1. Weather, cloudy.
Thermometer : Dry bulb, 67°·8. Wet bulb, 65°·0.
Barometer : 29·94. Depth, 154 fms. Bottom, black specks.

Fms.	Temp. °	Chlorine in grains per gallon.
0	67·1	1414·5
5	67·1	
10	67·0	
12	66·5	
14	64·9	
15	64·8	
17	63·1	
20	61·8	
25	60·5	
30	58·0	
40	55·0	
50	53·0	
60	52·3	
70	52·0	1394·5
80	51·1	
90	50·3	
100	49·4	
110	48·2	
130	47·5	
150	46·2	1409·5

Station XXI.

Position : Vasco de Gama Pk., S. 75° E., 13½ miles.
Date : 25th April, 1900, 11 a m.
Wind : Direction N. Force 2. Weather, clear.
Thermometer : Dry bulb, 69°·0. Wet bulb, 64°·3.
Barometer : 29·97. Depth : 166 fms. Bottom, Black specks.

Fms.	Temp. °	Chlorine in grains per gallon.
0	63·8	1409·5.
10	62·6	
14	61·0	
15	58·1	
16	57·3	
17	56·9	
18	56·5	
20	55 4	
30	53·8	
40	52·0	
50	51·3	
60	50·3	
70	49·4	1397·0
80	48·7	
100	47 4	
120	46·7	
140	46·6	
160	46·0	
165	46·0	1404·5

Station XXII.

Position : Vasco de Gama Pk, N. 73° E. 4¼ miles.
Date : 25th April, 1900, 4·5 p.m.
Wind : Direction, N. Force, 1. Weather, hazy.
Thermometer : Dry bulb, 64°·2. Wet bulb, 61°·3.
Barometer : 29·86. Depth : 36 fms, Bottom, rough.

Fms.	Temp. °	Chlorine in grains per gallon.
0	57·9	1397·0
5	53·3	
10	49·3	
20	48·8	1384·5
30	48·0	
35	48·0	1382·0

Station XXII. (*repeated*).

Position : Vasco de Gama Pk, N. 73°E. 4¼ miles.
Date : 26th April, 1900, 9·15 a.m.
Wind : Direction N. Force 5. Weather, overcast.
Thermometer : Dry bulb, 62.°8. Wet bulb, 60°·0.
Barometer : 29·85. Depth. 36 fms. Bottom, sand and shells.

Fms.	Temp. °	Chlorine in grains per gallon.
0	60·3	
3	60·0	
5	60·0	
6	59·0	
8	57·0	
9	54·5	
10	53·2	
15	50·8	
20	49·2	
30	48·5	
35	48·3	

Section XXIII.

Position : Vasco de Gama Pk, N. 37°W., 8 miles.
Date : 26th April, 1900, 11·35 a.m.
Wind : Direction, N. Force 5. Weather, overcast.
Thermometer : Dry bulb, 62°·5 Wet bulb, 60°·8
Barometer : 29·85. Depth : 48 fms. Bottom, rough.

Fms.	Temp. °	Chlorine in grains per gallon.
0	60·7	1399·5
3	60·3	
5	58·9	
6	54·1	
7	53·8	
8	54·0	
10	53·2	
20	51·2	
24	50·6	1392·0
30	50·0	
35	48·9	
40	48·3	
45	48·3	
47	48·3	1387·3

I may direct attention in the first place to the surface temperatures (Plate I.) It will be readily observed that there is a striking rise of temperature as we proceed from the shore. In the case of the line of Stations I to V, the former in Table Bay, and the latter 57 miles West, there is, a difference of 4·9 degrees. At Station VII. a temperature of 69°·9 was met with, a high temperature never observed in three year's observations at Simon's Bay or Robben Island. Further south this great body of warm water seems to approach nearer the shore, until at Cape Point within a few miles of the shore, a temperature of 60°·7 is found. An exception to this rise, as we proceed from the shore, is found in Stations III, X and XIII, which are respectively colder than the Stations next them on the landward side. As these observations were necessarily taken at different times we cannot, however, lay much stress on this, which may only be an accidental occurrence, especially as at Station XXII, where observations were repeated about 27 hours afterwards, a difference of 2°·4 was found.

The most marked difference in temperature in two neighbouring Stations occurred between Stations VIII and IX, respectively 69°·1 and 61°, a difference of 8°·1, there being, however, an interval of 6 days between these observations. It will be noted that when the higher temperature was observed there was a pretty strong breeze from the South, while at the time of observation of the lower temperature there was a slight wind from the North. On referring to the daily observations taken at 8 a.m. at Simon's Bay I find that there was a pretty strong South-East wind from the 16th to the 19th, and on the 20th and 21st of the same month a North-West and North wind respectively, and doubtless the difference of temperature is to be connected with this.

The temperature, observed at Station XXII, however, cannot be satisfactorily accounted for in this way, as the wind was from the North on both occasions, being indeed stronger when the higher temperature was observed.

The surface temperatures shown in Plate II are to be taken in connection with the preceding, and consist of, first, a series taken at intervals of about 5 miles on the 3rd March, 1898, showing the rise in temperature at a distance from the shore similar to that already observed, the difference between the 1st Station, about 7 miles off, and the last, about 40, being 9 degrees; second, several surface temperatures taken on a voyage to St. Helena Bay, 11-18th February, 1898, in which the temperatures 59° and 58° in St. Helena Bay may indicate an approach of the warm water to the shore in this region.

The three Plates III, IV and V show in a graphic form the limits of the water of higher temperature in a vertical direction, and it will be apparent that they afford evidence of the presence of an underlying colder mass of water quite foreign to the over-

lying parts. In this connection it may be observed how closely the lines, drawn at intervals of 5°, approach each other, in one instance showing a difference of 5° in less than 10 fathoms. The greatest difference observed in all the observations was 6°·9, within 5 fathoms. This was at Station XI, at a depth of 10 fathoms.

The following schedule shows the greatest differences and the depth at which they were observed, in the various Stations:—

Station No.	Greatest difference.	Depth Fms.	Station No.	Greatest difference.	Depth Fms.
	°			°	
I	4·8	0–10	XII reptd	2·7	3–6
II	6·3	0–10	XIII	2·8	23–25
III	2·9	14–24	XIV	2·8	30–35
IV	4·0	10–20	XV	4·6	30–40
V	4·0	10–20	XVI	2·9	30–35
V reptd	6·4	10–20	XVII	2·9	25–30
VI	5·8	12–15	XVIII	4·4	27–30
VII	3·7	30–40	XIX	3·3	10–12
VIII	3·0	25–30	XX	3·0	30–40
IX	4·6	25–30	XXI	2·9	14–15
X	3·2	5–8	XXII	4·6	0–5
XI	6·9	5–10	XXII reptd	2·5	8–9
XII	10·6	10–20	XXIII	4·8	5–6

It will be observed that the depth where the greatest change occurs is greater as we proceed from land. The mean depth at which the change occurs at Stations within 15 miles of the land is about 8 fathoms, at Stations further to sea 24 fathoms.

Briefly summarizing the results of these observations we find that there is off the Cape Peninsula a body of warm water of a higher temperature than that closer inshore, and in one instance higher than anything observed for at least 3 years in Table Bay or False Bay; secondly, that the difference of temperature within a few miles is marked, as also is the range of temperatures at the same Station in a few hours. Taking into consideration the limited number of observations, we may reasonably presume that further investigation will demonstrate these results in a still more striking manner.

II. Temperatures in Table Bay and False Bay (1898-1900).

We consider secondly a more reliable series of observations, reliable not in the sense that the observations have been more accurately made, but that they have extended over a longer period. These have been made by the Lighthouse Keepers on Robben Island in Table Bay and on Roman Rock in False Bay, and probably contain errors of observation and inaccuracies (readings of the thermometer being taken only to whole degrees) which do not appear in the more careful observations made on board the Government Steamer.

It will be apparent that such data throw additional light on those we have just been considering.

Observations of direction and force of wind were also taken with the daily temperatures, and these will probably afford some key as to the cause of this change of temperature, but inasmuch as this opens another aspect of the question, already complicated enough, it may be left over for seperate and more detailed investigation.

The following tables show (A) the mean, maximum, minimum and range of daily temperatures for each month of each year in Simon's Bay and Table Bay, (B) the same for the three years together, and (C) the mean, maximum, minimum and range of daily temperatures for each year, and (D) the three years together.

A. Monthly Mean, Maximum, Minimum and Range of daily temperatures for each month of the three years 1898, 1899, 1900.

SIMON'S BAY.

		Jan.	Feb.	Mar.	Apl.	May	Jun.	July	Aug.	Sept.	Oct.	Nov	Dec.
		°	°	°	°	°	°	°	°	°	°	°	°
Mean	1898 ..	66·1	65·7	61·1	59·9	56·3	55·6	—	57·2	56·7	59·1	61·9	63·0
	1899 ..	64·2	64·7	61·2	58·1	54·9	53·6	55·1	55·7	53·4	58·0	58·7	62·7
	1900 ..	64·7	65·7	64·1	62·1	61·4	59·4	56·1	55·4	57·3	58·1	61·8	64·2
Max.	1898 ..	69·0	69·0	64·0	63·0	61·0	61·0	—	66·0	60·0	61·0	65·0	67·0
	1899 ..	67·0	69·0	68·0	63·0	60·0	56·0	58·0	65·0	59·0	66·0	61·0	66·0
	1900 ..	68·0	68·0	68·0	66·0	64·0	62·0	62·0	57·0	59·0	62·0	64·0	66·0
Min.	1898 ..	58·0	61·0	58·0	50·0	50·0	50·0	—	55·0	49·0	56·0	59·0	61·0
	1899 ..	60·0	60·0	59·0	53·0	53·0	52·0	53·0	53·0	52·0	55·0	52·0	52·0
	1900 ..	60·0	62·0	59·0	54·0	59·0	58·0	51·0	52·0	53·0	54·0	59·0	62·0
Range	1898 ..	11	8	6	13	11	11	—	11	11	5	6	6
	1899 ..	7	9	9	10	7	4	5	12	7	11	9	14
	1900 ..	8	6	9	12	5	4	11	5	6	8	5	4

TABLE BAY.

		Jan.	Feb.	Mar.	Apl.	May	Jun.	July	Aug.	Sept.	Oct.	Nov	Dec.
Mean	1898 ..	59·3	58·0	58·6	54·3	55·1	55·5	55·4	56·0	57·0	58·2	59·8	56·7
	1899 ..	58·5	57·2	57·3	54·8	53·6	52·6	52·4	56·1	56·0	56·8	57·9	59·9
	1900 ..	58·2	59·1	56·5	58·0	57·1	55·8	55·0	55·6	56·7	59·3	59·2	60·8
Max.	1898 ..	64·0	62·0	62·0	57·0	57·0	63·0	59·0	58·0	61·0	60·0	62·0	60·0
	1899 ..	63·0	61·0	61·0	58·0	55·0	54·0	57·0	57·0	60·0	62·0	62·0	69·0
	1900 ..	63·0	65·0	61·0	61·0	59·0	58·0	57·0	59·0	59·0	63·0	65·0	66·0
Min.	1898 ..	53·0	54·0	54·0	50·0	53·0	53·0	52·0	49·0	53·0	56·0	57·0	54·0
	1899 ..	55·0	55·0	55·0	52·0	51·0	50·0	51·0	55·0	51·0	52·0	52·0	56·0
	1900 ..	55·0	54·0	50·0	56·0	52·0	49·0	50·0	53·0	54·0	56·0	53·0	58·0
Range	1898 ..	11	8	8	7	4	10	7	9	8	4	5	6
	1899 ..	8	6	6	6	4	4	6	2	9	10	10	13
	1900 ..	8	11	11	5	7	9	7	6	5	7	12	8

B. Monthly Mean, Maximum, Minimum, and Range of daily temperatures for the period 1898-1900.

SIMON'S BAY.

	Jan.	Feb.	Mar.	Apl.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Mean ..	65·0	65·4	62·1	60·0	57·5	56·2	55·6	56·1	55·8	58·4	60·8	63·3
Max. ..	69·0	69·0	68·0	66·0	64·0	62·0	62·0	66·0	60·0	66·0	65·0	67·0
Min. ..	58·0	60·0	58·0	50·0	50·0	50·0	51·0	52·0	49·0	54·0	52·0	52·0
Range ..	11	9	10	16	14	12	11	14	11	12	13	15

TABLE BAY

Mean ..	58°·6	58°·1	57° 5	55°·7	65°·3	54°·6	54° 2	55° 9	56°·6	58°·1	59°·0	59°·1
Max. ..	64·0	65·0	62·0	61·0	59 0	63·0	59·0	59·0	61·0	63·0	65·0	69·0
Min. ..	53 0	54·0	50·0	50·0	51·0	49·0	50·0	49·0	51·0	52·0	52·0	54·0
Range ..	11	11	12	11	8	14	9	10	10	11	13	15

C. The Mean, Maximum, Minimum and Range of daily temperatures for each year 1898, 1899, 1900.

		Simon's Bay.	Table Bay.
		°	°
Mean ..	1898	60 3	57·0
	1899	58·3	55·8
	1900	60·8	57·9
Maximum ..	1898	69·0	64·0
	1899	69·0	69 0
	1900	68·0	66·0
Minimum ..	1898	49·0	49·0
	1899	52·0	50·0
	1900	51·0	49·0
Range ..	1898	20·0	15 0
	1899	17·0	19·0
	1900	17·0	17·0

D. The Mean, Maximum, Minimum and Range of daily temperatures for the 3 years together, 1898–1900.

	Simon's Bay.	Table Bay.
	°	°
Mean	59·8	57·0
Maximum	69·0	69·0
Minimum	49·0	49·0
Range	20·0	20·0

The most striking feature in these observations is of course the great difference in temperature in waters only a few miles distant from each other, and we may obtain more striking evidence of this from the following table, showing the greatest contemporaneous difference occurring in each month of the three years. The time of observation was 8 a.m. both in Table Bay and Simon's Bay :—

Month.	Day.	Simon's Bay.	Table Bay.	Difference in favour of Simon's Bay.	Difference in favour of Table Bay.	Remarks.
1898.		°	°	°	°	
Jan. ..	29	65	53	12		
Feb. ..	11	68	57	11		
March .	14	62	57	5		
April ..	7	61	50	11		
May ..	2	61	55	6		
June ..	8	61	55	6		
	16	57	63	—	6	
July ..	—	—	—	—	—	No obs. taken at Simon's B.
Aug. ..	7	66	56	10		Monthly mean in Table Bay
Sep. ..	17	49	55	—	6	is greater than that of
October	1	60	56	4		Simon's Bay.
Nov.	19	64	57	7		
Dec. ..	15	65	54	11		
1899.						
Jan. ..	4	66	55	11		
Feb. ..	26	67	55	12		
March .	3	65	55	10		
April ..	25	60	52	8		
May ..	21	60	54	6		
June ..	7	53	50	3		
July ..	20	58	52	6		Monthly mean in Table Bay
Aug. ..	18	65	57	8	..	is greater than that of Simon's Bay.
Sept. ..	9	52	60	—	8	Do.
October	6	59	52	7		
Nov.	15	59	52	7		
Dec. ..	30	65	56	9		
1900.						
Jan ..	7	66	55	11		
Feb. ..	19	66	55	11		
March .	25	67	52	15	..	Greatest difference in the three years.
April ..	24	65	57	8		
May ..	7	62	52	10		
June ..	10	59	49	10		
July ..	1	62	57	5		Monthly mean in Table Bay
Aug. ..	7	54	57	—	3	is greater than that of
	8	56	53	3		Simon's Bay.
Sept. ..	7	59	56	3		
	26	56	59	—	3	
October	10	54	59	—	5	Do.
Nov. ..	14	62	53	9		
Dec. ..	9	65	58	7		

For the three years the mean temperature of Simon's Bay was $59^\circ{\cdot}8$, of Table Bay 57°, a difference in favour of Simon's Bay of $2^\circ{\cdot}8$. This difference is about the same in each of the three years 3·3, 2·5 and 2·9 degrees respectively, always however in favour of Simon's Bay.

Curiously enough the maxima and minima for the three years are identical in both cases, being 69° and 49°, the range therefore being the same, viz., 20°. The maxima and minima did not occur on the same date at the two places. The mean maximum of each of the three years of Simon's Bay however is 68° and of Table Bay 65°, a difference in favour of Simon's Bay of 3 degrees; the mean minimum of Simon's Bay being 52° and of Table Bay 50°·6, a difference in favour of Simon's Bay of 1·4 degrees. The annual range also is different, being, in the case of Simon's Bay 20°, 17°, 17°, and in the case of Table Bay 15°, 19°, 17°.

With the exception therefore of the absolute maximum and minimum, which are identical, there is a marked difference in favour of Simon's Bay in the three years, taken both collectively and individually.

When, however, we come to consider the case more particularly in regard to the monthly differences we find this is not so. Thus the mean monthly differences in favour of Simon's Bay are:— January 6°·4, February 7°·3, March 4°·6, April 4°·3, May 2°·2, June 1°·6, July 1°·4, August 0°·2, September −0°·8, October 0°·3, November 1°·8, December 4°·2. During the winter months, therefore, the mean monthly temperature of Table Bay approaches that of Simon's Bay; indeed, in each year it is higher in August or September, or both—(September of 1898, August and September of 1899 and August of 1900)—and for the three years together it is higher in the month of September. (*Vide* Plate VI.) We learn from the data also that in summer the temperature of the water in Simon's Bay is on an average 4 degrees higher than in Table Bay, while in winter it is only 1½ degrees, a fact no doubt connected with the prevalence of the south-east winds during the former period.

Before leaving this series of observations we may note an interesting comparison between the mean monthly temperatures observed at Robben Island and those published by the Meteorological Council, London, in 1882. These latter are contained in a series of charts with isothermal lines for the ocean district south of South Africa. The data were procured from logs of English and Dutch ships for the years 1853 to 1878. Plate VII shows the comparison between these.

It must be remembered however that the latter are temperatures taken at sea in the region off Table Bay. They do not therefore indicate any general change of temperature of the sea between the two periods of time, but they bring out markedly the fact already noted, of the existence of water of higher temperature, at a distance from land, and show that this seems to hold good generally.

We have now considered a series of observations at three different regions more or less isolated around the Cape Peninsula, viz :—(1) those to the West of the Cape Peninsula, showing high temperatures off shore and great variations in temperature and specific gravity, (2) those at Simon's Bay, characterized by a higher temperature than (3) those at Robben Island, which are characterized by their relatively low temperature.

We therefore turn with some interest to

III. *Observations between Table Bay and False Bay.*

These consist of (1) records of temperatures and water samples obtained by the Government Steamer on various voyages between Cape Town and Simon's Town, taken at such intervals as time and weather permitted, (2) a record of temperatures and water samples taken by the Mail Steamers at Table Bay, Hout Bay, Cape Point and Cape Hangklip.

As before, these observations are recorded in extenso, as being of more importance than any deductions which may at this stage be drawn from them.

Temperatures observed on voyage of S.S. *Pieter Faure* between Cape Town and Simon's Town on 1st November, 1897.

Time.	Locality.	Latitude.	Longitude.	Surface Temperature.	Specific Gravity.	Chlorine in Grs. per Gallon.	Sulphuric Oxide.
From noon to 7 p.m.	Mouille Point	33° 53′ S.	18° 25′ E.	60·5°	Not determined	1439·3	Not determined
	Sea Point	,, 55′	,, 21′	60·0	..	1446·7	..
	Duiker Point	34° 2′	,, 16′	60·0 (bottom 50°)	..	1441·7	..
	Slangkop Point.. ..	,, 7′	,, 16′	56·5	..	1436·8	..
	,, ,, ...	,, 15′	,, 18	55·0	..	1439·3	..
	Cape Point, S.E. ½ E. ..	,, 20′	,, 20′	55·0	..	1436·8	..
	,, E.S.E. ½ E.	,, 22′	,, 24	60 0	..	1446·7	..
	,, N.E. ½ E...	,, 24′	,, 28′	61·0	..	1446.7	..
	,, N. ¾ E. ..	,, 24′	,, 31′	61·5	..	1461·6	..
	,, N.W. by W.	,, 22′	,, 34′	60·0	..	1444·2	..
	Smitswinkel Bay ..	,, 17′	,, 33′	61·5	..	1451·7	..
	Oatland Point	,, 13′	,, 31′	61·0	..	1451·7	..

Temperatures observed on voyage of S.S. *Pieter Faure* between Cape Town and Simon's Town, on 17th November 1897. *

Hour.	Locality.	Latitude.	Longitude.	Surface Temperature. °	Specific Gravity.	Chlorine in Grs. per Gal.	Sulphuric Oxide.
6·20 p.m.	Table Bay	33° 53′ 34″	18° 25′ 24″	54·0			Not determined.
6·15 ,,		,, 53′ 24″	,, 24′ 42″	54·0			
6·10 ,,		,, 53′ 34″	,, 23′ 51″	55·1			,,
6· 5 ,,		,, 53′ 56″	,, 23′ 6″	54·9			,,
6· ,,		,, 54′ 23″	,, 22′ 29″	55·0	1·02682	1394·6	,,
5·55 ,,	Sea Point	,, 54′ 53″	,, 21′ 52″	55·4			,,
5·50 ,,		,, 55′ 24″	,, 21′ 19″	56·1			,,
5·45 ,,		,, 55 59″	,, 20′ 51″	58·1			,,
5.40 ,,		,, 56′ 36″	,, 20′ 30″	57·9			,,
5.35 ,,		,, 57′ 12″	,, 20′ 15″	58·2			,,
5·30 ,,		,, 57′ 60″	,, 19′ 57″	58·0	1·02662	1384·7	,,
5 25 ,,		,, 58′ 29″	,, 19′ 36″	56·0			,,
5·20 ,,		,, 59′ 6″	,, 19′ 17″	56·0			,,
5·10 ,,		,, 59′ 38″	,, 19′ 0′	59·0	1·02669	1394·6	,,
5· ,,		34° 0′ 23″	,, 18′ 41″	58·1			,,
4·55 ,,		,, 0′ 59″	,, 18′ 25″	57·9			,,
4·50 ,,	Duiker Point	,, 1′ 36″	,, 18′ 16″	58·0			,,
4·45 ,,		,, 2′ 20″	,, 18′ 0″	58·0			,,
4·40 ,,		,, 3′ 0″	,, 17′ 55″	58·0	1·02675	1394·6	,,
4·30 ,,		,, 3′ 39″	,, 17′ 49″	60·0			,,
4·25 ,,	Hout Bay	,, 4′ 18″	,, 17′ 49″	59·9			,,
4·20 ,,		,, 4′ 55″	,, 17′ 48″	60·0			,,
4·15 ,,		,, 5′ 36″	,, 17′ 48″	59·1			,,
4· ,,		,, 6′ 12″	,, 17′ 48″	60·4	1·02674	1379·7	,,
3 55 ,,		,, 6′ 52″	,, 17′ 48″	59·0			,,
3·50 ,,		,, 7′ 33″	,, 17′ 48″	59·5			,,
3·45 ,,	Slangkop Point . ..	,, 8′ 11″	,, 17′ 48″	60·0			,,
3 30 ,,		,, 8′ 50″	,, 17′ 48″	59·0	1·02661	1394·6	,,

* See Plate IX.

Temperatures observed on voyage of S.S. *Pieter Faure*, between Cape Town and Simon's Town, on 17th November, 1897.—*Continued.*

Hour.	Locality.	Latitude.			Longitude.			Surface Temperature	Specific Gravity.	Chlorine in Grs. per Gal.	Sulphuric Oxide.
								°			
3·25 p.m.		34°	9'	26"	18°	18'	0"	58·0			Not determined.
3 20 ,,		,,	10'	5"	,,	18'	18"	60·0			
3·15 ,,		,,	10'	37"	,,	18'	35"	59·0			,,
3·10 ,,		,,	11'	16"	,,	18'	51"	60·7	1·02659	1409·5	,,
3· ,,		,,	11'	52"	,,	19'	5"	69·6			,,
2·45 ,,		,,	12'	29"	,,	19'	18"	61·0			,,
2·40 ,,		,,	13'	5"	,,	19'	30"	63·0			,,
2·35 ,,		,,	13'	42"	,,	19'	45"	65·5			,,
2·30 ,,		,,	14'	36"	,,	20'	0"	65·5	1·02679	1405·5	,,
2·25 ,,		,,	14'	54"	,,	20'	12"	65·5			,,
2 20 ,,		,,	15'	28'	,,	20'	33"	65·0			,,
2· ,,		,,	16	2"	,,	20'	57"	64·0	1·02709	1424·0	,,
1·55 ,,		,,	16'	39"	,,	21'	15"	64·1			,,
1·50 ,,		,,	17'	12"	,,	21'	39"	64·2			,,
1·45 ,,		,,	17'	46"	,,	22'	0"	64·2			,,
1·40 ,,		,,	18'	18"	,,	22'	24"	64·1	1 02694	1404·5	,,
1·35 ,,		,,	18'	4[illegible]"	,,	22'	52"	64·5			,,
1·30 ,,		,,	19'	18"	,,	23'	23'	64·5			,,
1·25 ,,		,,	19'	42"	,,	23'	56"	64·4			,,
1·20 ,,		,,	20'	5"	,,	24	36"	64·2			,,
1·15 ,,		,,	20'	24"	,,	25'	15"	64·3			,,
1·10 ,,		,,	20'	42"	,,	25'	55"	64·3			,,
1· 5 ,,		,,	21'	0"	,,	26'	36"	64·4			,,
1· 0 ,,	Cape Point	,,	21'	18"	,,	27'	18"	64·0			,,
12·55 ,,		,,	21'	31"	,,	28'	0"	62·4			,,
12·45 ,,		,,	21'	40"	,,	28'	45"	62·3	1·02708	1419·4	,,
12·40 ,,		,,	21'	46"	,,	29'	33"	62·5			,,
12 35 ,,		,,	21'	40"	,,	29'	52"	62·0			,,

Temperatures observed on voyage of S.S. *Pieter Faure*, between Cape Town and Simon's Town, on 17th November 1897.—*Continued.*

Hour.	Locality.	Latitude.			Longitude			Surface Temperature.	Specific Gravity.	Chlorine in Grs. per Gal	Sulphuric Oxide.
								°			
12·30 p.m.		34°	21′	27″	18°	30′	23″	63·0			Not determined.
12·15 ,,		,,	20′	12″	,,	30	6′	63·0			
12· noon.	Buffels Bay	,,	18′	54′	,,	29′	46″	63·0	1·02707	1404 5	,,
11·45 a.m.		,,	16′	48″	,,	30′	6″	63·3			,,
11·30 ,,		,,	15′	4″	,,	29′	45″	63·1	1·02697	1394·6	,,
11·15 ,,		,,	13′	10″	,,	29′	22″	64·0			,,
11· ,,		,,	10′	42″	,,	28′	10″	64·0			,
10·45 ,,	Simon's Bay	,,	10′	24″	,,	26′	:7′	64·0			,,

Temperatures observed on voyage of S.S. *Pieter Faure* between Cape Town and Simon's Town on 5th January, 1898.

Locality.	Latitude.	Longitude.	Surface Temperature.	Specific Gravity.	Chlorine in Grs. per Gal.	Sulphuric Oxide.
			°			
Green Point	33° 53′ 36″	18° 23′ 57″	59·0	Not determined.	1399·5	Not determined.
Sea Point, 1 mile	,, 54′ 51″	,, 21′ 48″	58·0	1·02671	1402·0	,,
Camps Bay	,, 56′ 30″	,, 20′ 36″	57·5	1·02671	1402·0	,,
Oude Kraal, 2½ miles	,, 58′ 24″	,, 19′ 30″	58 0	1·02668	1402·0	,,
Little Lion's Head	34° 0′ 22″	,, 18′ 45″	61·0	1·02690	1414·5	,,
Duiker Point	,, 2′ 15″	,, 17′ 57″	64·0	1 02704	1422·0	,,
Hout Bay	,, 4′ 18″	,, 17′ 57″	64 5	1·02706	1424·5	,,
Chapman's Bay..	,, 6′ 24″	,, 17′ 57″	65·0	1·02706	1429·0	,,
Slangkop Point	,, 8′ 27″	,, 17′ 57″	65·0	1·02706	1424·5	,,
,, 1½ miles	,, 10′ 25″	,, 18 30″	64·0	1·02706	1417·0	,,
,, 3½ ,, ...	,, 12′ 21″	,, 19′ 15″	63·0	1·02712	1412·0	,,
Kromme River	,, 14′ 18″	,, 20′ 6″	63·0	1·02696	1414·5	,,
Olifants Bosch Pt.	,, 16′ 12″	,, 21′ 0″	63·0	1·02700	1409·5	,,
,, ,, ,, 2 miles.. ..	,, 18 0″	,, 22′ 7″	62·0	1·02686	1402·0	,,
,, ,, ,, 3 miles.. ..	,, 19′ 37″	,, 23′ 26″	62 0	1 02684	1414·5	,,
Cape Maclear	,, 21′ 14″	,, 25′ 6″	63·0	1·02700	1422·0	,,
,, ,, 2 miles	,, 22′ 48″	,, 26′ 36″	68·5	1·02728	1434·0	,,
,, ,, 2⅓ ,, ...	,, 24′ 12″	,, 28′ 27″	69·5	1·02719	1434·0	,,
Cape Point, 2½ ,, ...	,, 23′ 42″	,, 30′ 51″	69·9	1·02728	1434 0	,,
,, ,, 1 ,, ...	,, 21′ 42″	,, 31′ 24″	70 0	1·02728	1434·0	,,
Buffels Bay, 2½ ,, ...	,, 19′ 39″	,, 30′ 39″	69·8	1·02722	1434·0	,,
Paulsberg	,, 17′ 39″	,, 30′ 24″	69 1	1·02726	1436·5	,,
Smitswinkel Bay	,, 15 36″	,, 30′ 15″	69·0	1·02728	1434 0	,,
Rockland Pt.	,, 13 33″	,, 30′ 12″	68·5	1·02720	1402·0	,,

Temperatures observed on voyage of S.S. *Pieter Faure* between Cape Town and Simon's Town on 29th January, 1898.

Locality.	Latitude.	Longitude.	Surface Temperature.	Specific Gravity.	Chlorine in Grains per Gal.	Sulphuric Oxide.
Lion's Head	33° 55′ 42″	18° 21′ 6″	° 50·5	1·02637	1399·5	Not determined.
Camps Bay	,, 56′ 30′	,, 20′ 36″	50 0	1·02665	1397·0	,,
White Sand	,, 59′ 6″	,, 19′ 24″	50 0	1·02663	1394·5	,,
Duiker Point	34° 2′ 16″	,, 18′ 24″	53·0	1·02658	1397·0	,,
Hout Bay	,, 4 36″	,, 17′ 54′	54·0	1·02648	1399·5	,,
Chapman's Bay	,, 5′ 45″	,, 17′ 54″	55 0	1 02676	1412 0	,,
Cape Maclear	,, 24′ 15″	,, 28′ 42″	63·0	1·02634	1419·5	,,
Buffels Bay	,, 19′ 0″	,, 30′ 39″	59·0	1·02716	1431·5	,,
Oatland Point	,, 12′ 23″	,, 29′ 36″	65·0	1·02714	1419·5	,,

Temperatures observed on voyage of S.S. *Pieter Faure* between Cape Town and Simon's Town on 13th March, 1898.

Locality.	Latitude.	Longitude.	Surface Tempera-ture.	Specific Gravity.	Chlorine in Grains per Gal.	Sulphuric Oxide.
Sea Point, S.	..	..	° 62·0	..	..	Not determined.
Lion's Head, E.S.E.	..	..	62·8	1·02663	1389·5	,,
Sandy Patch, S. x E.	..	..	61·1	1 02671	1379·5	,,
Hout Bay S. x E	..	..	60·0	1·02671	1392·0	
,, ,, N. x E.	..	..	52·6	1·02675	1384·5	,,
Slangkop Point	..	..	52·0	1·02669	1384·5	,,
, , ...	..	..	51·2	..	..	,,
Cape Point S.E ½ S	..	..	55·0	1·02653	1384·5	,,
, N.N.E.	..	..	63·0	1·02697	1402·0	,,
Buffels Bay	..	..	63·0	1·02695	1402·0	,
Noah's Ark	..	..	61·2	1·02689	1384·5	
	..	..	61·8	1·02697	1392·0	

Temperatures observed on voyage of S.S. *Pieter Faure* between Cape Town and Simon's Town on 2nd June, 1898.

Locality.	Latitude.	Longitude.	Surface Temperature	Specific Gravity.	Chlorine in Grains per Gal.	Sulphuric Oxide.
			°			
Green Point	33° 54′ 24″	18° 23′ 12″	57·7	..	..	Not determined.
Camps Bay	,, 56′ 36″	,, 21′ 36″	58·4	1·02695	1394·5	,,
Oude Kraal	,, 58′ 42″	,, 20′ 12″	58·0	..	..	,,
Sand Bay	34° 0 54″	,, 18′ 48″	56·9	1·02693	1394·5	,,
Duiker Point	,, 3′ 0″	,, 17′ 12″	58·1	..	..	..
Hout Bay	,, 5′ 0′	,, 15′ 30″	58·5	1·02693	1394·5	..
Slangkop Point	,, 9′ 48″	,, 17 48″	58·6	1·02699	1399 5	,,
,, ,, $3\frac{1}{2}$ miles	,, 12′ 24″	,, 19′ 0″	56·9	..	..	..
Kromme River	,, 14′ 42″	,, 19′ 54″	57·7	1·02695	1397·0	,,
Olifants Bosch Point	,, 17′ 12″	,, 21′ 12″	57·6	..	..	,,
Black staff and ball .. .	,, 19′ 36″	,, 22′ 12″	57·9	1·02699	1392·0	..
,, ,, ...	,, 22′ 0″	,, 23′ 12″	56·9	..	..	,,
Cape Maclear, 3 miles	,, 22 54″	,, 25′ 24″	57·5	1·02697	1394·5	,,
,, ,, 2 ,, ...	,, 23′ 36″	,, 28 22″	57·1	..	..	,,
Cape Point, $3\frac{1}{2}$ miles	,, 24 12″	,, 31′ 24″	55·8	1·02695	1392·0	,,
,, ,, 2 ,, ...	,, 22 0″	,, 32′ 0″	56·6	..	..	,,
Vasco de Gama Peak	,, 19′ 36″	,, 31′ 24″	56·9	1·02735	1394·5	,,
White staff and ball	,, 17′ 24″	,, 30′ 36″	57·1	..	..	,,
Miller's Point	,, 14′ 54″	,, 29′ 48′	57·1	1·02715	1394·5	..
Oatland Point	,, 12′ 36″	,, 29′ 12″	56·6	..	..	..

Temperatures observed on voyage of S.S. *Pieter Faure* between Cape Town and Simon's Town on 23rd September, 1898.

Time.	Locality.	Latitude.	Longitude.	Surface Temperature.	Specific Gravity.	Chlorine in Grains per gallon.	Sulphuric Oxide
				°			
Noon.	.. ..	33° 56′ S.	18° 21′ E	59·1	1·02669	1402·0	175·0
12·15 p.m.	.. ..	,, 57′½ ,,	,, 20′ ,,	60·1	1·02679	1402 0	168·8
12·30 ,,	.. ..	,, 58′½ ,,	,, 19′ ,,	60·0	1·02675	1404·5	173·1
12·45 ,,	.. ..	,, 59′½ ,,	,, 18′ ,,	59·5	1·02681	1397·0	171·2
1·00 ,,	.. ..	34° 2′½ ,,	,, 17′ ,,	60·2	1·02685	1394·5	165·0
1·15 ,,	.. ..	,, 4′ ,,	,, 17′ ,,	58 1	1·02676	1394·5	166·4
1·30 ,,	.. ..	,, 6′½ ,,	,, 17′½ ,,	58·7	1·02677	1394·5	174·6
1·45 ,,	.. ..	,, 8½ ,,	,, 17′ ,,	56·6	1·02681	1399·5	174 6
2·00 ,,	.. ..	,, 10′½ ,,	,, 17′ ,,	56·5	1·02703	1404 5	181·3
2·15 ,,	.. ..	,, 13′½ ,,	,, 18′ ,,	55·0	1·02699	1399·5	155·8
2·30 ,,	.. ..	,, 15′½ ,,	,, 19′½ ,,	54·2	1·02697	1394·5	182·3
2·45 ,,	.. ..	,, 18′ ,,	,, 20′½ ,,	55·9	1·02701	1407·0	177 5
3·00 ,,	.. ..	,, 20′ ,,	,, 22′½ ,,	57·2	1·02721	1402·0	166·9
3·15 ,,	.. ..	,, 21′ ,,	,, 24′ ,,	58·7	1·02699	1409·5	172·7
3 30 ,,	.. ..	,, 22′ ,,	,, 25′ ,,	59 0	1·02707	1409·5	161·1
3·45 ,,	.. ..	,, 23′½ ,,	,, 26′½ ,,	59·0	1·02689	1402·0	169 3
4·00 ,,	.. ..	,, 23′½ ,,	,, 28 ,,	59·7	1·02737	1404·5	168·3
4·15 ,,	.. ..	,, 24′½ ,,	,, 30′ ,,	59·4	1 02693	1407·0	160·6
4·30 ,,	.. ..	,, 23′ ,,	,, 32′ ,,	59 4	1·02709	1406·0	184·7
4·45 ,,	.. ..	,, 21′ ,,	,, 33′ ,,	59 5	1·02705	1407·0	182 3
5·00 ,,	.. ..	,, 19′ ,,	,, 31 ,,	59·7	1·02721	1404·5	158·7
5·15 ,,	.. ..	,, 17′ ,,	,, 30′½ ,,	59 7	1·02711	1404 5	159·7
5·30 ,,	.. ..	,, 14′½ ,,	,, 30′ ,,	59 4	1.02717	1399·5	176 5
5·45 ,,	.. ..	Simon's	Bay.	59·4	1·02717	1399·5	178·9

The curves on Plate VIII are drawn from these observations and show the mean temperature and specific gravity at or near five stations between Table Bay and Simon's Bay. The most striking feature is the sudden rise at Cape Point, both in temperature and specific gravity. There is, however, a rise of temperature and specific gravity in a less degree both on the west and east side of the Peninsula, viz., from Sea Point to Hout Bay, and from Cape Point to Smitswinkel Bay. The slight fall in temperature between Hout Bay and Slangkop would perhaps disappear if the curve were drawn from a more extended series of observations, as the individual series show great ranges of temperature in short distances. This is shown in curves drawn from one of these series (Plate IX). The vertical lines here represent intervals of 5 minutes during the voyage, or a little less than three-quarters of a mile, and in this short distance we find in one case a rise of temperature of two and a half degrees near Slangkop Point. The longest interval on the voyage in which the same temperature was observed was one half-hour, representing about $4\frac{1}{4}$ miles This occurred between Cape Point and Simon's Bay.

Plate X shows the mean temperature and specific gravity observed at intervals between Table Bay and Danger Point by the mail steamers. These means have been deduced from 21 observations, selected from a series taken between Table Bay and Port Natal, which will be fully dealt with in a later paper.

They illustrate the same general rise of temperature, most marked at Cape Point, and the same striking rise in specific gravity already noted (Plate VIII).

The following is the detailed record of these observations: —

Surface Temperatures, Specific Gravity, &c., of Sea Water observed by Mail Steamers from June, 1898, to June, 1899.

Date of Voyage.	Surface Temperature.					Specific Gravity.					Chlorine—in Grains per Gallon.					Sulphuric Oxide.				
	Table Bay.	Hout Bay	Cape Point.	Cape Hanglip.	Danger Point.	Table Bay.	Hout Bay.	Cape Point.	Cape Hanglip.	Danger Point.	Table Bay.	Hout Bay.	Cape Point.	Cape Hanglip.	Danger Point.	Table Bay.	Hout Bay.	Cape Point.	Cape Hanglip.	Danger Point.
	°	°	°	°	°															
10.6.98	55	54	54	54	51	1·02683	1·02701	1·02693	1·02703	1·02723	1417·0	1424·5	1419·5	1429·5	1432·0	168·3	171·7	177·5	176·0	181·8
25.6.98	57	57	57	58	60	1·02681	1·02697	1·02697	1·02701	1·02704	1422·0	1417·0	1419·5	1427·0	1422·0	175·0	178·0	192·5	187·1	175·0
16.7.98	56	49	58	58	58	1·02669	1·02585	1·02697	1·02699	1·02705	1414·5	1429·5	1427·0	1429·5	1429·5	202·9	177·5	148·6	181·3	174·6
3.8.98	57	58	60	60	58	1·02683	1·02699	1·02713	1·02709	1·02713	1414·5	1417·0	14 2·0	1414·5	1414·5	178·0	181·3	181·3	184·2	194·8
20.8.98	57	59	53	59	58	1·02639	1·02699	1·02693	1·02706	1·02703	1392·0	1402·0	1401·5	1412·0	1404·5	184·2	175·0	179·9	199·1	194·8
10.9.98	...	57	57	57	57	...	1·02711	1·02715	1·02713	1·02715	...	1405·5	1404·5	14·7 0	1409·5	...	170·2	158·7	188·0	192·4
30.9.98	...	...	59	59	60	...	...	1·02705	1·02719	1·027 6	...	...	1417·0	1412·0	1412·0	...	...	174·1	155·3	183·1
22.10.98	56	61	64	63	61	1·02675	1·02707	1·02718	1·02715	1·02743	1397·0	1404·0	1412·0	1417·0	1419·5	162·1	157·3	163·5	167·2	167·2
18.10.98	61	60	60	60	63	1·02703	1·02697	1·02684	1·02716	1·02723	1402·0	1399·5	1402·0	1414·5	1414·5	164·5	167·8	162·1	163·2	164·2
-- 11 98	58	58	60	64	63·5	...	1·02686	1·02700	1·02727	1·02725	...	1417·0	1419·5	1417·0	1422·0	...	159·7	176·5	170·2	168·3
21.11.98	..	58	65	65·5	64		1·02689	1·02711	1·02717	1·02731	...	1407·0	1417·0	1419·5	1422·0	...	160·1	168·3	159·3	173·6
24.11.98	51	47	58	59	56	1·02663	1·02667	1·02719	1·02722	1·02721	1384·5	1392·0	1414·5	1422·0	1424·5	163·0	166·4	170·7	178·0	165·9
7.12.98	58	53	62	63	63	1·02655	1·02712	1·02726	1·02687	1·02735	1392·0	1409·5	1424·5	1422·0	1434·5	123·6	159·7	164·0	163·0	164·0
28.12.98	59	56	67	68	69	1·02669	1·02687	1·02721	1·02727	1·02727	1389·5	1399·5	1412·0	1394·5	1412·0	123·6	161·6	175·0	165·9	175·5
21.2.99	54	59	70	70	69	1·02661	1·02657	1·02713	1·02693	1·02641	1379·5	1377·0	1402·0	1402·0	1419·5	162·6	162·6	133·5	168·8	170·0
18.3.99	58	62	71	70·5	69	1·02663	1·02587	1·02715	1·02729	1·02735	1382·0	1402·0	1439·5	1417·0	1427·0	166·4	163·5	167·8	164·2	165·4
7.3.99	61	54	59	63	59	1·02651	1·02661	1·02677	1·02693	1·02673	1384·5	1379·5	1394·5	1409·5	1394·5	159·0	159·5	154·9	171·7	155·3
30.3.99	54	50	52	56	57	1·02665	1·02654	1·02693	1·02671	1·02671	1402·0	1407·0	1429·5	1414·5	1412·0	171·7	163·3	159·7	162·1	154·9
7.4.99	...	55	59	60	59	...	1·02649	1·02677	1·02687	1·02669	...	1407·0	1427·0	1424·5	1417·0	..	174·6	178·0	169·3	168·3
18.5.99	54	53·5	58	58	60	1·02647	1·02647	1·02691	1·02695	1·02686	1399·5	1409·5	1424·5	1422·0	1424·5	168·8	176·0	157·7	168·8	165·0
7.6.99	52	53	54	57	58	1·02680	1·02677	1·02679	1·02689	1·02691	1389·5	1387·0	1387·0	14 7 0	1414·5	163·5	155·3	168·3	167·8	167·4
Averages	56·05	55·67	60·09	60·95	60·73	1·02671	1·02683	1·02701	1·02705	1·02706	1397·6	1404·5	1415·2	1415·9	1418·1	164·8	167·3	168·6	172·6	172·5

With regard to the bearing of these observations on the currents of the sea we may perhaps infer in the first place that not only does a considerable body of the warm Agulhas current flow into False Bay, thus accounting for the higher temperature there as compared with Table Bay (a fact already well known), but also that a large portion escapes round the Cape Peninsula, passes close to the Cape of Good Hope, and proceeds northwards at a greater distance from the land, that it is of no great depth, 20—30 fathoms at most within 50 miles of the shore, and that it is much influenced by the direction of the wind. Between this and the Cape Peninsula is a body of water of lower temperature and specific gravity, being doubtless the welling up of the Antarctic current passing under the warm current and impinging on the west side of the Peninsula. From the sudden and marked changes in temperature in this region it is evident that there is considerable commingling of the currents.

As the Equatorial current, passing south along and round the coast of Africa, is successively called the Mozambique and Agulhas Current, so we may designate this last section of the current, passing up the West Coast, the Cape Current.*

I have intentionally refrained from elaborating any generalisations or in any way straining the facts, which are all too scanty, and repeat that the observations are, at this stage, of more importance than the deductions drawn from them, if only as showing the nature of the problems awaiting solution.

It is to be hoped that opportunity may be afforded of investigating the matter more fully and of making additional observations. From a scientific, but most of all from a practical point of view, this is of the greatest importance, not only as throwing light on such practical questions as the migration, appearance and disappearance of fishes of commercial value, but also on those unexpected and so far unexplained changes in currents, which have been the cause of so many shipping disasters on the West Coast

* Note.—Additional evidence on this point is afforded by courses of drift bottles, an account of which will be published shortly.

EXPLANATION OF PLATES.

Plate I. Surface temperatures at Stations I–XXIII visited between 5th March and 26th April, 1900.

Plate II. Surface temperatures observed off Table Bay 3rd March, 1898, and on a voyage to St. Helena Bay from 11th to 18th February, 1898.

Plate III. Section through Stations I–VI showing isothermal lines for 60°, 55° and 50°, together with bottom temperatures. Depth is in fathoms.

Plate IV. Section through Stations VI–XI showing isothermal lines for 60°, 55°, 50° and 45° together with bottom temperatures.

Plate V. Section through Stations XVII–XX showing isothermal lines for 60°, 55°, 50° and 45° together with bottom temperatures.

Plate VI. Mean monthly temperatures of surface water in Simon's Bay and Table Bay for the period 1898–1900.

Plate VII. Mean monthly temperatures observed off Table Bay 1853–1878, and in Table Bay 1898–1900.

Plate VIII. Mean temperatures and specific gravity of sea water at or near five Stations between Table Bay and False Bay.

Plate IX. Temperatures and specific gravity observed at intervals of 5 minutes on a voyage between Table Bay and Simon's Bay on 17th November, 1897. The vertical lines represent intervals of 5 minutes.

Plate X. Temperatures and specific gravity of sea water of observations by Mail Steamers from June, 1898, to June, 1899.

[Published 15th March, 1902.]

PLATE I.

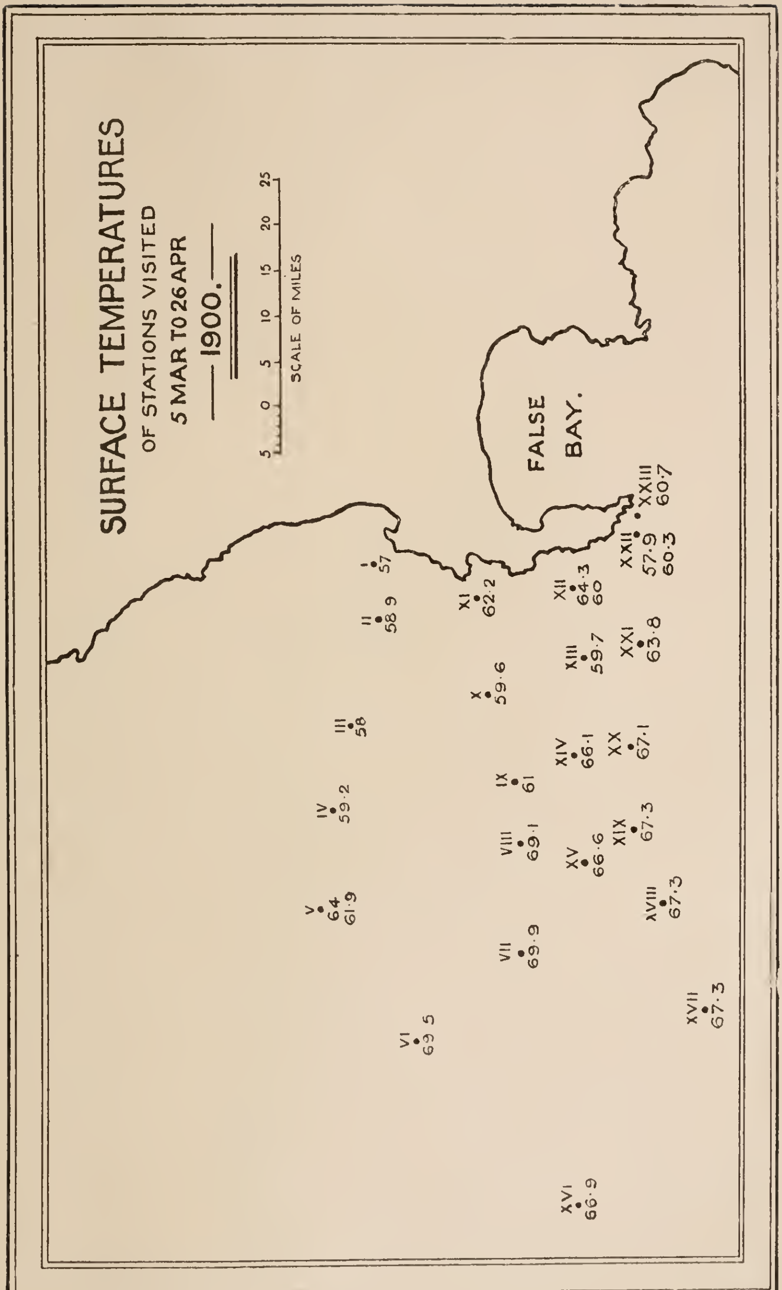
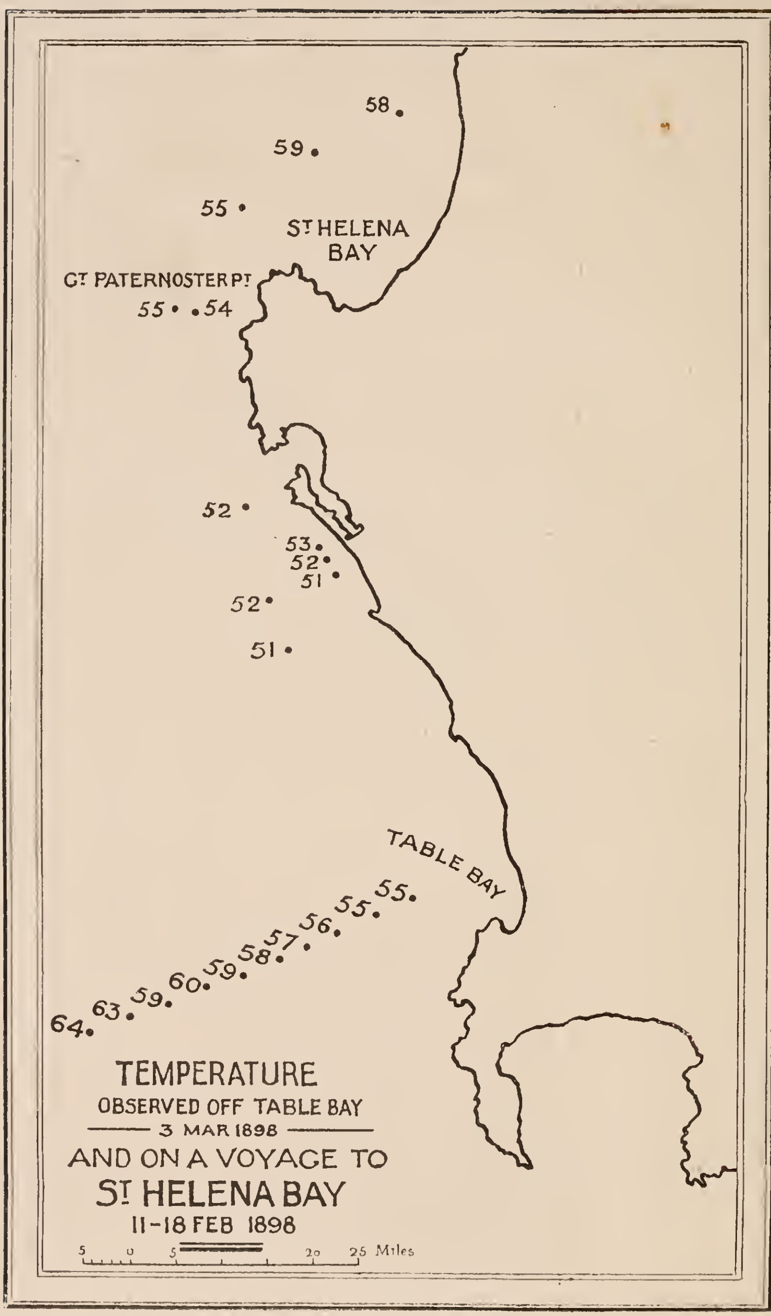

SURFACE TEMPERATURES
OF STATIONS VISITED
5 MAR TO 26 APR
1900.
5 0 5 10 15 20 25
SCALE OF MILES
FALSE BAY.
I 57
II 58 9
III 58
IV 59·2
V 64 61·9
VI 69 5
VII 69·9
VIII 69·1
IX 61
X 59·6
XI 62·2
XII 64·3 60
XIII 59·7
XIV 66·1
XV 66·6
XVI 66·9
XVII 67·3
XVIII 67·3
XIX 67·3
XX 67·1
XXI 63·8
XXII 57·9 60·3
XXIII 60·7

PLATE II.


58
59
55
ST HELENA BAY
CT PATERNOSTER PT
55
54
52
53
52
51
52
51
TABLE BAY
55
55
56
57
58
59
60
59
63
64
TEMPERATURE
OBSERVED OFF TABLE BAY
3 MAR 1898
AND ON A VOYAGE TO
ST HELENA BAY
11-18 FEB 1898
5 0 5 20 25 Miles

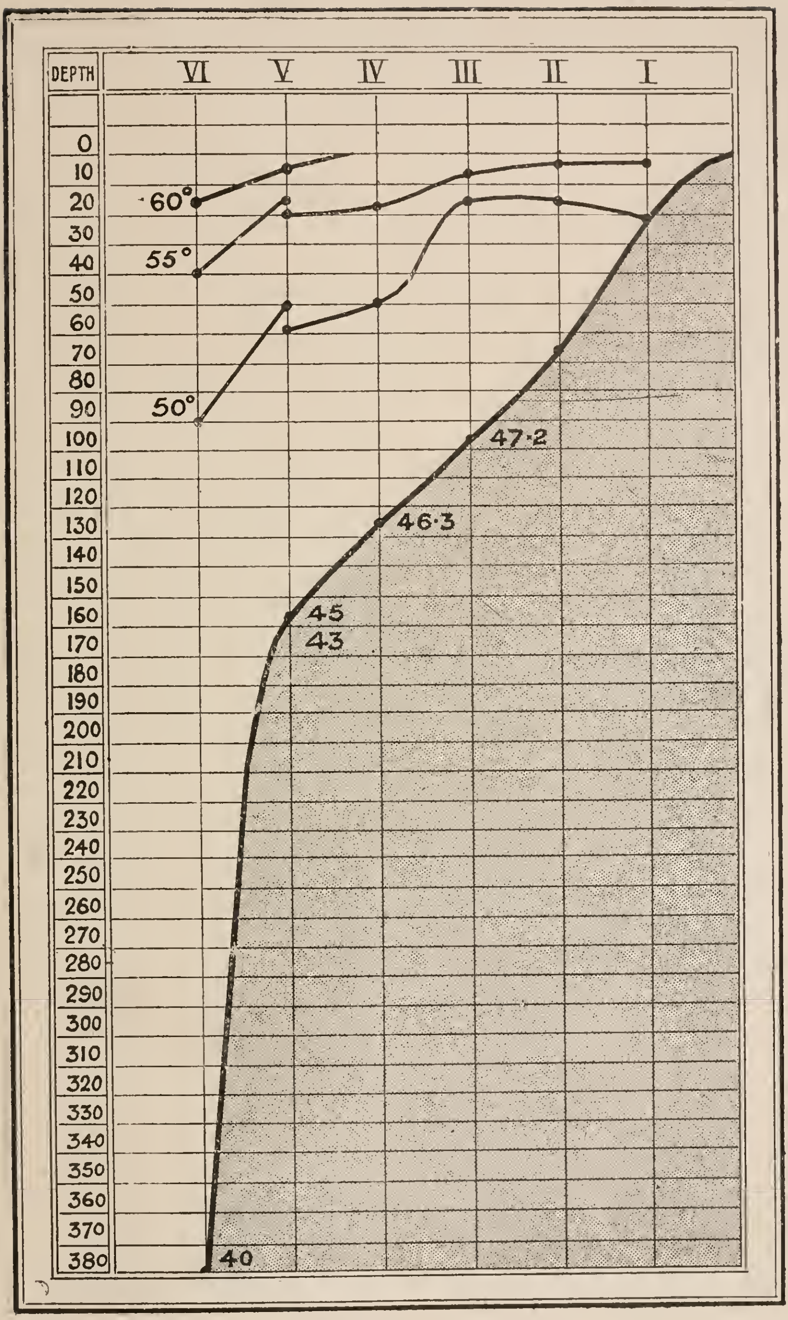
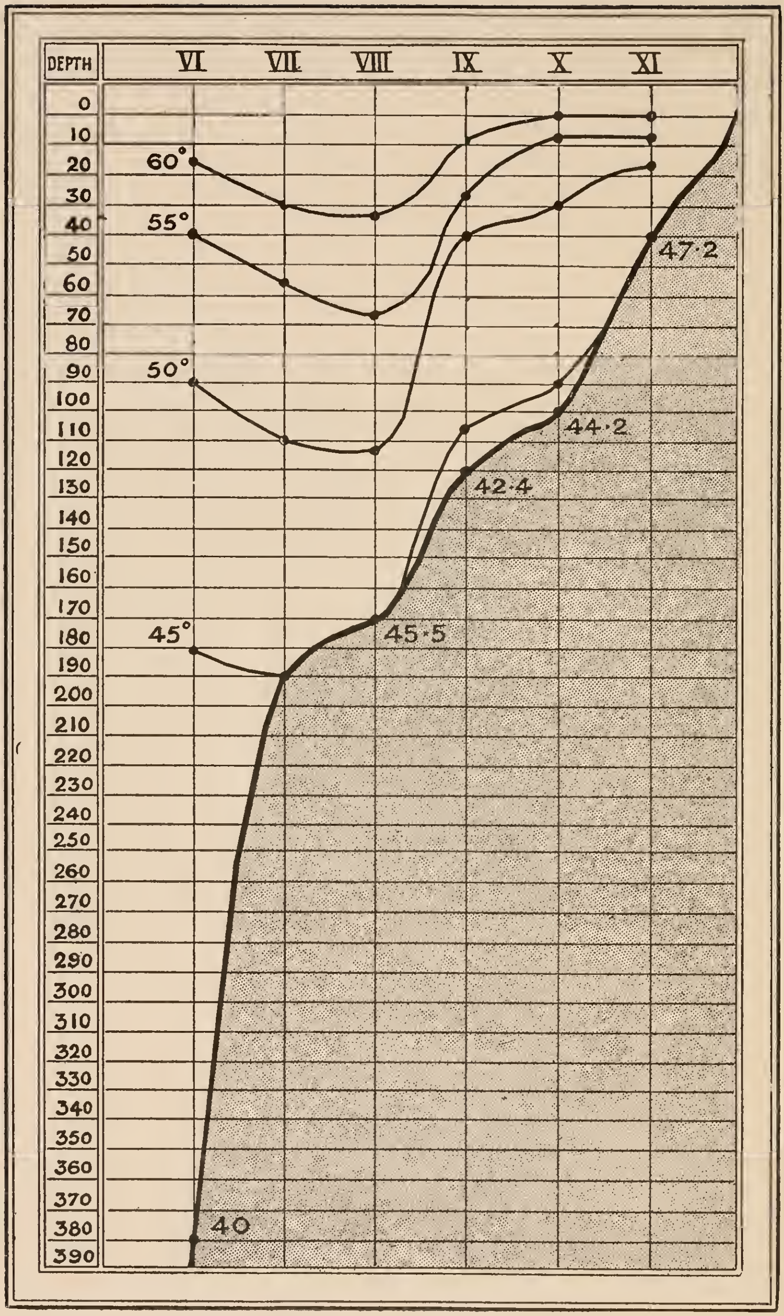

DEPTH
VI
V
IV
III
II
I
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200
210
220
230
240
250
260
270
280
290
300
310
320
330
340
350
360
370
380
60°
55°
50°
47·2
46·3
45
43
40

PLATE IV.



DEPTH
VI
VII
VIII
IX
X
XI
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200
210
220
230
240
250
260
270
280
290
300
310
320
330
340
350
360
370
380
390
60°
55°
50°
45°
47·2
44·2
42·4
45·5
40

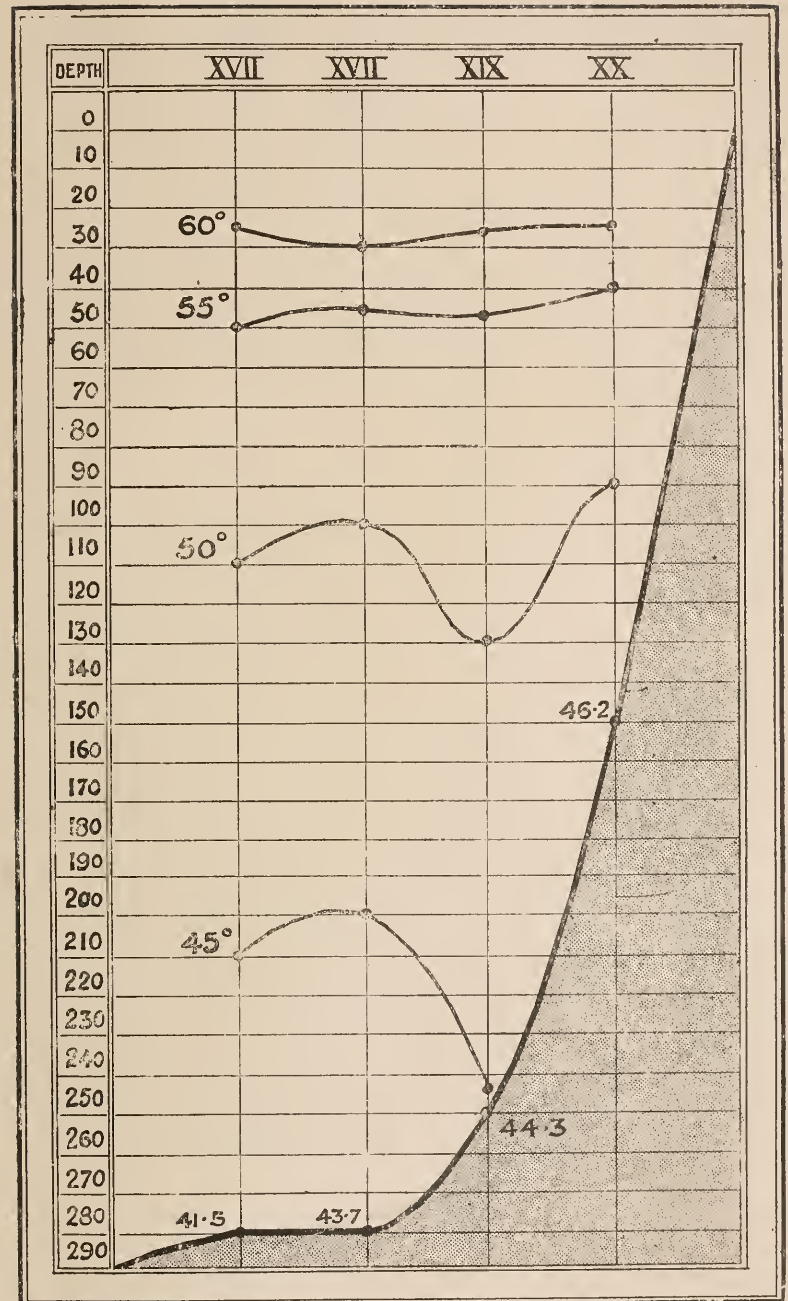

DEPTH
XVII
XVII
XIX
XX
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200
210
220
230
240
250
260
270
280
290
60°
55°
50°
45°
46·2
44·3
41·5
43·7

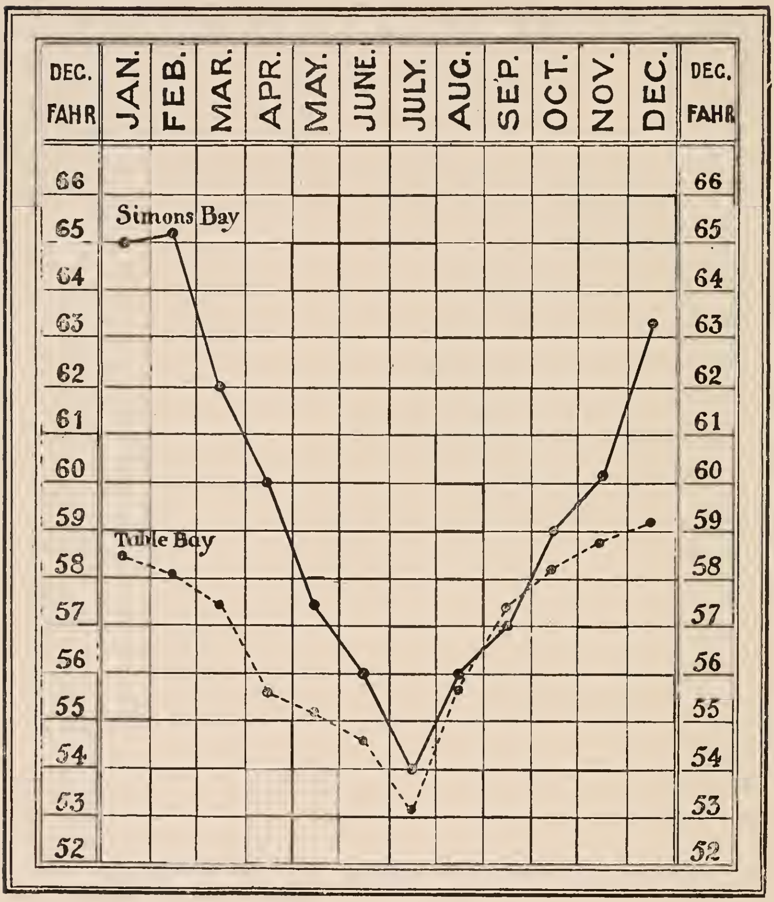
PLATE VI.

MEAN MONTHLY TEMPERATURE

AT

SIMONS BAY & TABLE BAY

FOR THE PERIOD 1898-1900



MEAN MONTHLY TEMPERATURE

TEMPERATURE OBSERVED OFF TABLEBAY 1853-78.

DO. DO. IN TABLE BAY 1898-1900.

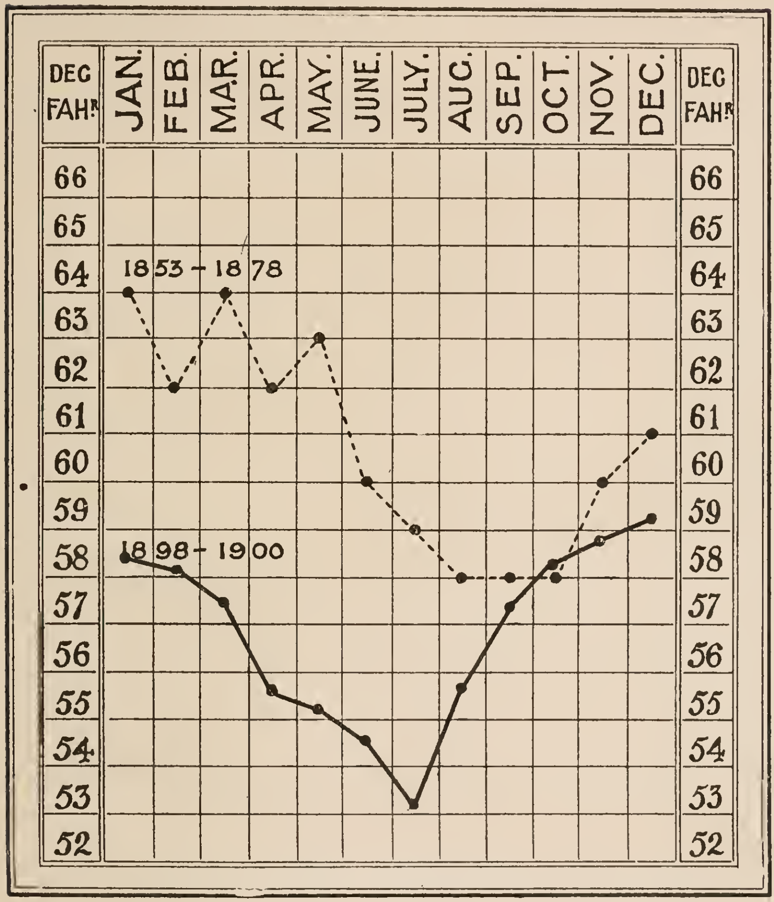


PLATE VIII.

MEAN TEMPERATURE AND SPECIFIC GRAVITY

OF SEA WATER

BETWEEN TABLE BAY AND FALSE BAY

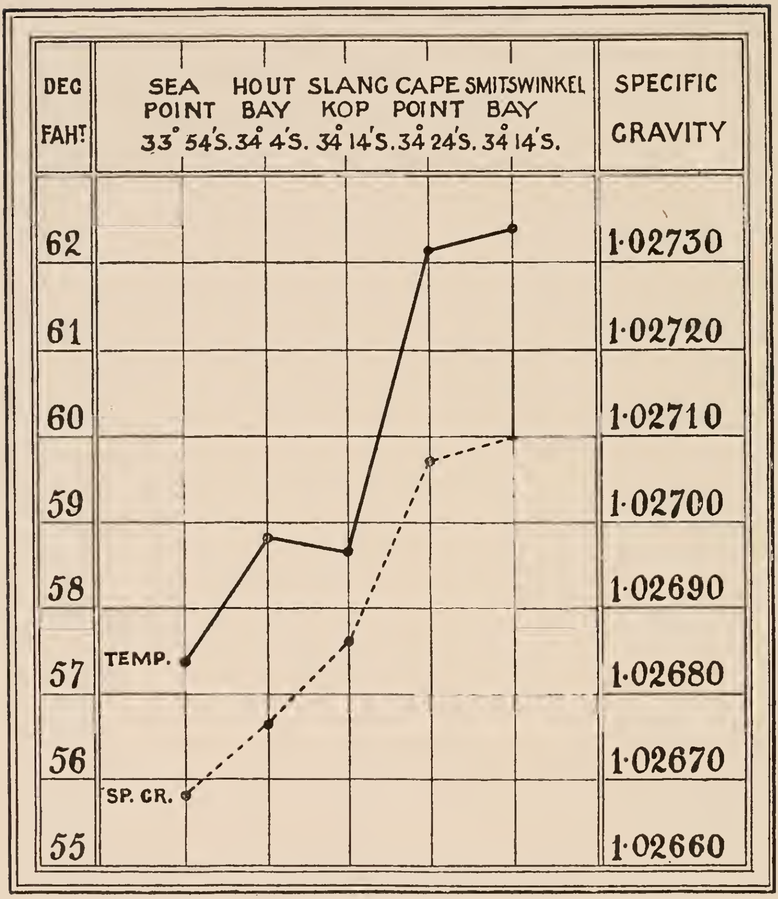
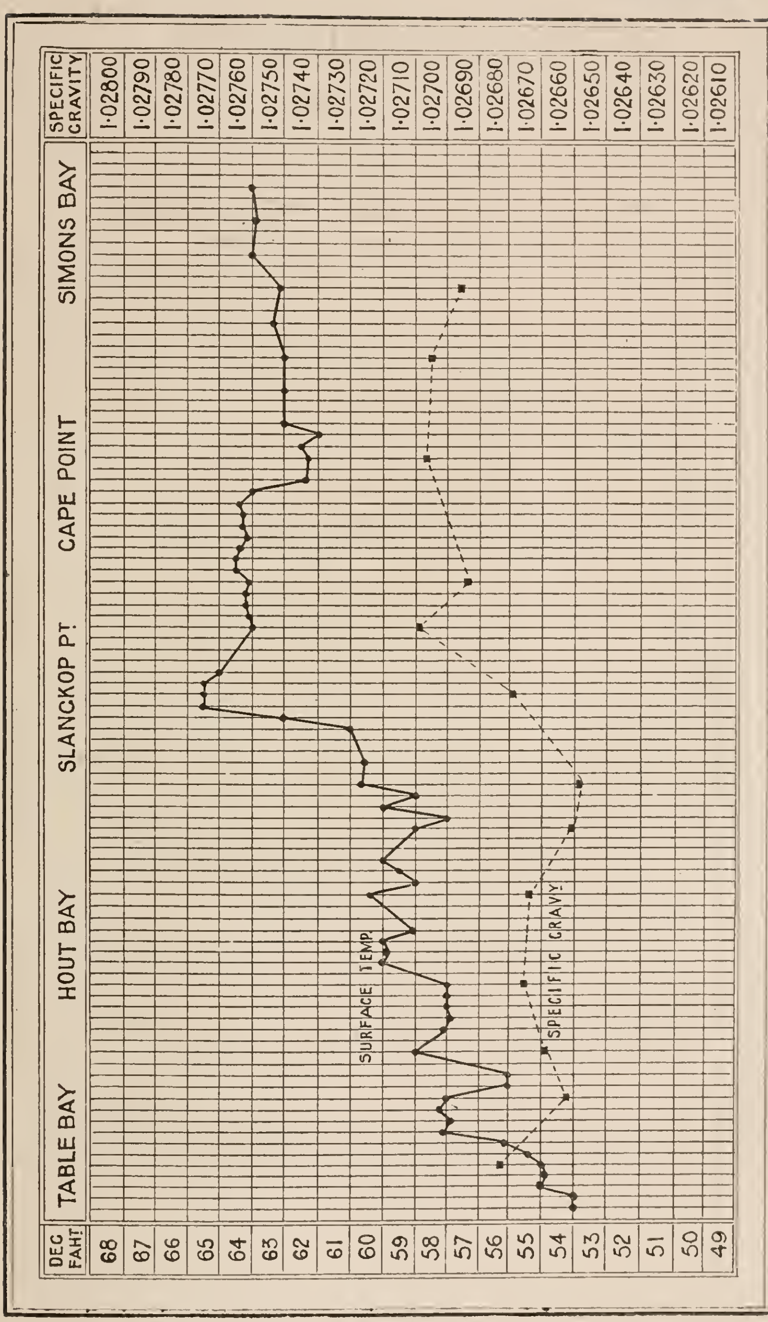


PLATE IX.



SPECIFIC GRAVITY
1·02800
1·02790
1·02780
1·02770
1·02760
1·02750
1·02740
1·02730
1·02720
1·02710
1·02700
1·02690
1·02680
1·02670
1·02660
1·02650
1·02640
1·02630
1·02620
1·02610
SIMONS BAY
CAPE POINT
SLANCKOP PT.
HOUT BAY
TABLE BAY
DEG FAHT.
68
67
66
65
64
63
62
61
60
59
58
57
56
55
54
53
52
51
50
49
SURFACE TEMP.
SPECIFIC GRAVY.

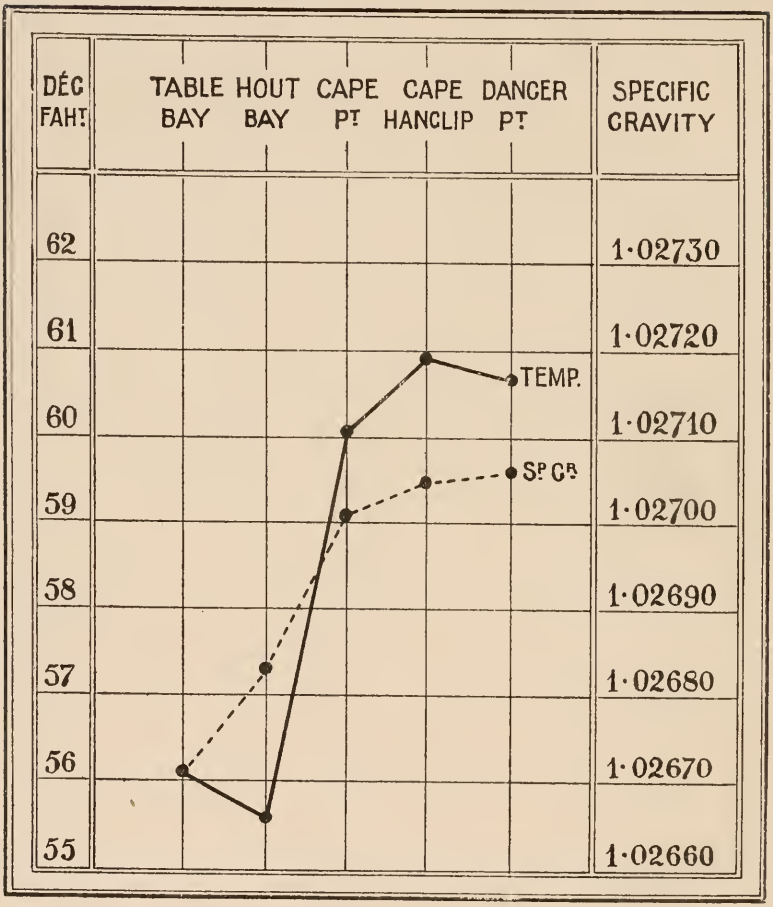
PLATE X.

TEMPERATURE AND SPECIFIC GRAVITY

OF SEA WATER

OBSERVED BY MAIL STEAMERS

FROM JUNE 1898 TO JUNE 1899



DESCRIPTIONS

OF

SOUTH AFRICAN SPONGES

BY

R. KIRKPATRICK, F.Z.S.,
BRITISH MUSEUM (NATURAL HISTORY).

———:o:———

Dr. J. D. F. Gilchrist, Government Biologist, of Cape Town, has recently sent to the British Museum a collection of Sponges dredged by him off the coasts of Cape Colony and Natal from depths ranging from 13 to 300 fathoms. Most of the specimens were preserved in formalin, but some were dried. All the wet specimens have been transferred to alcohol. By the kind permission of Professor E. Ray Lankester, their description has been entrusted to me. This collection contains several new and interesting forms, and this is not surprising, seeing how little has hitherto been done towards working out the Sponge Fauna of South Africa.

In the present paper the Hexactinellida and Tetractinellida Choristida are described.

Below is a list of species :—

HEXACTINELLIDA.

Family **Rossellidæ.**

1. **Rhabdocalyptus plumodigitatus**, Kirkpatrick.
2. **Crateromorpha lankesteri**, sp. n.

species [10], p. 105, of this genus the autogastralia are hexactine or hexactine and pentactine. In a species of a closely allied genus, *Staurocalyptus pleorhaphides*, Ijima [3], p. 58, both the dermal and gastral membranes are supported by spinous diactines.

Locality.—Large specimen, Lion's Head N. 73° E. distant 28 miles, depth 140 fathoms; small specimen, Lion's Head N. 63° E. distant 34 miles, depth 154 fathoms. Both specimens obtained by shrimp trawl.

Sub-family **Rossellinæ**, F. E. Schulze [8], p. 348.

Genus **Crateromorpha** (Gray), Carter.

Crateromorpha lankesteri, sp. n.

Plate I, figs. 1-11.

Sponge trumpet-shaped, with a well-developed curved stalk expanding into a wide shallow trumpet-like expansion or cup facing laterally, the central axis of the cup continuing the curve of the stalk. Colour pale yellow, and the texture of the cup-wall like that of loose felt. Dermal surface of the cup even, and covered with a fine lace-like reticulum. Gastral surface covered with a continuous mesh-work, papillated at the base of the cup, and roofing over the efferent canals and stalk canals. Edge of cup, thin, sharp-cut, without a fringe of spicules.

Stalk curved, sub-cylindrical, diminishing slightly from below upwards; compressed laterally below, and from before backwards at the upper end, where it expands funnel-like into the cup. Surface covered with a yellow fluff. Texture firm, felt-like, slightly compressible. With four or more anastomosing longitudinal canals in the centre.

Skeleton. The bulk of the skeleton is composed of a network of bundles of diacts, with medium-sized and large hexacts interspersed; the intermedia consist solely of oxyhexasters. The lace-like dermal membrane, which is supported by pentacts, covers a hypodermal network formed of bundles of diacts. Beneath a gastral layer of pentacts is a hypogastral network of diacts, the strands of which are covered with small hexacts. The vertical ray of the dermal and gastral pentacts projects into the parenchyma. The stalk is formed of longitudinal bundles of diacts supported here and there by very large solitary diacts, and of medium-sized, usually solitary, diacts arranged in horizontal plane and frequently radiating.

The fluff which covers the surface is chiefly composed of pentacts. Small hexacts line the stalk canals.

SPICULES. Parenchymal diacts (Figs. 5, 6), 1360 to 3100 × 5 to 10 μ, smooth, but with roughened rounded ends, and occasionally with two or four knobs with aborted axial canals; triacts and tetracts of the same character as the diacts, occurring rarely. Large diacts of stalk (Fig. 7) 10 mm. × ·128 mm.

Parenchymal hexacts of various sizes, the largest with conical rays each 620 μ in length, and with centrum 32 μ in diameter.

Autodermal pentacts with rough truncate rays each 285 μ in length, and without a distal knob. The surface pentacts of the stalk (Fig. 9) with long smooth tapering tangentials each 220 to 520 μ in length, the vertical ray being sharp-pointed and from 50-100 μ in length.

Autogastral pentacts (Fig. 8) mostly resembling autodermal pentacts, but some in the floor of the cup having smooth tapering rays like those of the stalk pentacts.

Hypogastral hexacts (Fig. 10) and the slightly smaller hexacts of the stalk canals regular, with roughened blunt-pointed rays 40-110 μ in length, with a small centrum.

Intermedia, oxyhexasters (Fig. 11) 62 μ in diameter, the almost aborted primary rays giving rise to two (usually) or three secondary rays with roughened surface.

The species is named after Professor E. Ray Lankester.

Locality.—Three specimens were obtained by shrimp trawl from a depth of 250 to 300 fathoms, East London N.W. ½ N. distant 18 miles. Bottom—broken shells, hard ground.

Of the three specimens two are dried and the third and smallest is preserved in formalin. The largest (A) is 31 cm. in height, the diameter at the rim being 22 cm., and the depth of the cup 11 cm.; the length of the stem is 22 cm., the diameter below being 3 × 6 cm., and at the upper end 4 × 3 cm.; the system of canals in the centre of the stem occupies, near the lower end, a diameter of 0.6 cm.

The dimensions in centimetres of specimens B and C are as follows:—

	B.	C.
Height	20	12
Diameter of rim	15	7
Length of stalk	10	6

Specimen B has a double stem, a long slit-like fenestra extending nearly the whole length. Specimen A was the best preserved, but even here, the dermal membrane and to a still greater extent the autogastral layer had almost disappeared.

Trawls and dredges are not quite suitable implements for obtaining delicate Hexactinellid Sponges, much better success being obtained by the "long-line" method advocated by Ijima, [4], and [5], p. 16.

The specimens appear to have been torn up from their points of attachment; the lower ends are clear of any foreign matter.

The new species differs from others of the genus not only in its remarkable shape, but also in the absence of discohexasters. These spicules occur in all other species of *Crateromorpha*, and in all the genera of *Rossellinae* except *Bathydorus*. It does not seem necessary, however, to establish a new genus to include the new species.

Owing to the hypogastral membrane of *C. lankesteri* being continuous, the inner surface of the cup-wall does not present the cavernous aspect usually seen in species of *Crateromorpha*.

The hard-felt-like texture of the stalk partly arises from the absence of synapticulæ, which, in some species, *C. meyeri* for instance, weld the lower end of the stalk into a compact mass of stony hardness.*

Family **Tetillidæ**.

Genus **Spongocardium**, gen. nov.

Tetillidae free, ellipsoidal, with a poral vestibule at one end and an oscular cloaca at or near the other end of the long diameter of the upper surface.

Spongocardium gilchristi, sp. n.

Plate II, figs. 1, 1A, and Plate III, fig. 1.

Sponge with the upper surface somewhat flattened, and the lower surface deeply convex.

Poral vestibule usually with a spicular fringe, and oscular cloaca usually with a sharp cut edge without fringe. Surface of poral vestibule smooth and uniform; surface of oscular cloaca reticulate, with oscules (.25—.5 mm. in diameter) in the meshes of the network. Poral vestibule always much deeper than the oscular cloaca. Colour pale buff, the interior being lighter. Surface level but rough, forming a firm cortex, apparently devoid of pores. Beneath the semi-translucent surface a network of white strands visible.

Skeleton mainly formed of bundles of triænes and oxea radiating from centre to periphery, and embracing the poral and oscular depressions; skeletal cortex formed of the cladal ends of the triænes and of tangentially arranged oxea, the clear spaces visible through the surface being partly filled in by the ends of the radiating bundles. In the walls of the poral and oscular depressions, slender tufts of trichodal prodiænes spreading out in fan-like manner as they approach the surface.

Spicules. Megascleres.—Oxea (Fig. 1a). 8 to 10 mm. × .08 to .1 mm., slightly curved, sharp-pointed. Tylotes 3100 × 21 μ,

* In a letter received by me after the proofs of this paper were printed, Dr. Gilchrist writes:—"Very large specimens of this species (*Crateromorpha lankesteri*) were got, the diameter of one of the largest being about three feet. Attempts were made to preserve these, bnt when dried they crumbled on handling."

smooth, curved, with long oval head 45 μ in breadth not uncommon at the surface. Small oxea (Fig. 1b) 1900 $\times$ 30 μ.

Anatriænes (Figs. 1g, g′), rhabdome 9.4 mm. $\times$ .02 mm., with fine hair-like terminations; length of cladus 75 μ, chorda 110 μ.

Protriænes (Figs. 1c, c′) with short stout cladi; rhabdome 5300 $\times$ 31 μ, length of cladus 78 μ, chorda 70 μ.

Protriænes (Fig. 1h) trichodal, rhabdome 690 $\times$ 2 μ; cladi unequal, longest cladus 45 μ.

Prodiænes (Figs. 1k, k′) trichodal, abundant in poral and oscular areas with dimensions equal to those of trichodal protriænes; cladi about equal.

Orthotriænes (Fig. 1d), rhabdome 4900 $\times$ 35 μ; length of cladi 340 μ, slightly curved. Fig. 1d′ represents a plagiotriæne, which only occurs rarely.

Orthodiænes (Fig. 1e), abundant, and orthomonænes (Fig. 1f) with dimensions similar to those of the orthotriænes.

Microscleres.—Sigmaspires of two kinds, viz., a serpentine variety (Fig. 1l) abundant, 35 to 45 μ in length, with long open coils, and a smaller C-and-S shaped variety (Fig. 1m) 16 to 20 μ in length.

Locality.—Cape Natal W. by N. ¾ N., 11 miles; depth 185-200 fathoms. Bottom—sand and mud; obtained by shrimp trawl.

The new species is represented by five specimens, the largest of which is 8 $\times$ 6.5 cm. in horizontal plane, by 5 cm. in height, and the smallest 3.5 $\times$ 2.6 cm. in horizontal plane by 2.8 cm. in height. Of the five specimens, four are provided with a fringe round the poral vestibule, but only one with a well-marked fringe round the oscule, a poral fringe being also present in the latter instance. The nearest allied genus is *Cinachyra* of Sollas, with its numerous poral and oscular depressions. *C. barbata* Sollas [11], p. 23, pls. iii. and xxxix., from Kerguelen is provided with a dense root-tuft and with a cortical layer of radially arranged oxea. *C. voeltzkowi* Lendenfeld [7], p. 101, pl. ix., fig. 35-53, from Zanzibar is a spherical free sponge with numerous oscular cloacæ and with the pores generally distributed over the surface; again, *Tetilla hirsuta* Dendy [2], p. 75, from the Gulf of Manaar has numerous poral and oscular pits. The chief character of the new genus is the localisation of the poral and excurrent openings each in one well-defined region. The pores occupy, in the floor of the vestibule, oval spaces bounded by the tufts of trichodal prodiænes, and open into the distal ends of sphinctrate chones, which merge below into sub-cortical spaces, whence ringed in-current canals proceed. The oscular cloaca presents small circular sphictrate excurrent openings one in each mesh of the superficial network formed by strands of soft tissue. The generic name is suggested by that of the Echinoderm genus *Echinodcardium*, in which the shape of the shell with its mouth and madreporite resembles that of the sponge. The species is named after Dr. Gilchrist.

Genus Tetilla.

Tetilla bonaventura, sp. n.

Plates II and III, fig. 2.

Sponge shaped like a mushroom with a thick stem. The dome-shaped upper surface finely hispid, with several small oscules 1.5 mm. in diameter. Colour a dirty greenish grey.

Spicules. Megascleres.—Oxea (Fig. 2a) $4200 \times 48\ \mu$, almost straight, slightly aniso-actinate, sharp-pointed. Smaller curved oxea and styles (Figs. 2b, b′), $1085 \times 31\ \mu$.

Anatriænes (Fig. 2c, c′), rare, rhabdome $8000 \times 7\ \mu$, enlarging up to $12.5\ \mu$ in width at junction with cladome; length of cladu 60 μ, chorda 90 μ.

Anadiænes (Fig. 2d), abundant, and anamonænes (rare), of the same dimensions as the anatriænes, from which they have been derived.

Protriænes (Fig. 2f, f′) $2720 \times 12.5\ \mu$ with terminations of extreme tenuity; length of cladus 100 μ, chorda 60 μ.

Prodiænes (Fig. 2g) of approximately similar dimensions to protriænes figured in fig. 2f.

Trichodal protriænes (Fig. 2h), rhabdome 190 μ, one cladus 25 μ, the other two each 8 μ in length.

Microscleres. Sigmaspires (Fig. 2k), 11.5 μ.

Locality.—False Bay, 22 fathoms.

The single specimen is 4 cm. in height and 5 cm. in diameter in horizontal plane. The new species resembles *T. coronida* Sollas, and *T. pedifera* Sollas in having anamonænes, but *T. pedifera* has no microscleres; the anamonæne of *T. coronida* probably results from the reduction of a protriæne, but in the present species from a reduced anatriæne, the shape of the anamonæne being very different in the two cases.

Another characteristic feature of the new specics is the occurrence of the anadiænes.

Tetilla casula, Carter.

Plate II, figs. 3, 3A.

1871, **Tethya casula**, Carter [1], p. 43.

1888, **Tetilla casula**, Sollas [11], p. 99, pl. IV., figs. 1-9.

The one example of this species occurring in the present collection presents a very different appearance from the type specimen figured by Carter [1], pl. iv. fig. 1. The former has the shape of a solid sphere segment or low circular dome with a flat under surface. It seemed, at first sight, as though the specimen were a piece sliced off from a spherical sponge. Dr. Gilchrist remembered, however, the sponge being brought to the surface in the condition in which he sent it. The flat base is 5 cm. in diameter, and the height 1.7 cm. The convex surface, over the lower half of

the slope, presents tufts of spicules (oxea and protriænes) which form a fringe round the circular edge. The surface is smooth and even, excepting where fissures have formed, in one of which the excurrent canals opens. The colour is greenish grey. On section the nucleus, whence the skeletal fibres radiate, is seen to be on the vertical axis passing from base to apex, and at the junction of the middle and lower third.

The spiculation is identical with that of the type specimen.

The under surface of the new specimen is smooth and free from foreign bodies, but the same region in the type is encrusted with sand particles.

The remarkable shape of the type specimen evidently results from contraction due to drying.

Locality.—False Bay, S. Africa, 22 fathoms; the type specimen came from Port Elizabeth.

Family **Pachastrellidæ.**

Genus **Pachastrella**, Schmidt.

Pachastrella caliculata, sp. n.

Plates II and III, fig. 4.

Sponge caliculate with thick rounded rim and hard thick walls. Outer poral surface smooth, here and there nodulated; inner oscular surface finely cribriform over nearly the whole area, oscules about .75 mm. Colour pale buff.

Skeleton mainly composed of densely-packed calthrops of various sizes, with bundles of oxea arranged at right angles to the sponge surfaces; microstrongyles forming a dense surface layer and distributed through the body of the sponge.

Spicules. Megascleres.—Oxea (Fig. 4a) 4800 $\times$ 45 μ, straight or curved, with sharp or rounded points.

Calthrops of many sizes (Fig. 4b-f), the largest with thick rays, each 1085 $\times$ 240 μ, ends pointed, but often obtuse and contorted; some with a fourth ray longer than the other three.

Microscleres.—Microstrongyles (Fig. 4g) 12 $\times$ 5.5 μ, prolate-ellipsoid, with granulated surface.

Microrhabds (Fig. 4h) 25 $\times$ 3 μ, curved, closely and finely spined, not centro-tylote.

Amphiasters (Fig. 4k) 11 $\times$ 11 μ, including spines, with 4-5 truncated rays with granular surface.

Locality.—Durnford Point, Natal, N.W. $\frac{3}{4}$ W., distant 12 miles; depth 90 fathoms. Bottom—broken shells.

The solitary specimen, which is shaped somewhat like a sitz-bath without the bottom, has been cut off sharp from its attachment.

The greatest height is 10 cm; the diameter of the cut base 10 cm.; the thickness of the wall at the cut base 3 cm., and of the edge .75 cm.

The surface is encrusted with several other sponges, and infested with embedded barnacles opening at the surface.

The most characteristic feature of the new species is the caliculate shape. The spiculation closely resembles that of *Pachastrella monilifera* Schmidt, but the megascleres of the former are considerably larger than those of the latter. *P. abyssi* O.S. is here regarded as synonym of *P. monilifera*, O.S., as pointed out by Topsent [12], p. 380.

Pachastrella isorrhopa, sp. n.

Plates II and III, fig. 5.

Sponge massive; pores and oscules not apparent; colour brown; arrangement of skeleton as in preceding species.

Spicules. Megascleres.—Oxea, 3100 × 31 μ, straight or curved.

Amphityles (Fig. 5a) 480 × 10 μ, smooth, curved; head 25 × 10.5, long oval; neck 5 μ; common in one specimen (A), rare in a second specimen (B).

Strongyles (Fig. 5b) 330 × 5.5 μ, smooth, straight; not found in A, not uncommon in B.

Smooth curved oxea (? foreign) 270 × 9.5.

Calthrops, largest with each ray 590 × 62 μ.

Microscleres.—Microstrongyles, 12 × 5.5 μ, prolate-ellipsoid, with granular surface.

Microrhabds, 11-33 μ in length by 2.7 μ in breadth, curved and crooked, closely and finely spined, not centro-tylote.

Amphiasters 11 × 11 μ, with 3-5 rough truncate rays. (There is no room in the Plate for figures of all the spicules).

Locality.—Cone Point, Natal, N.W. ½ W., distant 4 miles; depth 34 fathoms. Bottom—broken shells.

The new species is represented by two specimens. Specimen A (the type), of triangular elevation, is 7 cm. in width, 2.5 cm. in thickness and 5 cm. in height; the colour is dark brown. Specimen B forms a flattened cake-like mass, 8 × 5 cm. in area, and 4 cm. in height, the colour being paler than that of specimen A. Both specimens are infested with barnacle-shells, which permeate the whole mass of specimen B.

This species differs but little from the preceding and from *P. monilifera* Schmidt, the chief distinguishing feature being the curious amphityle spicules.

Both the specimens, A and B, are associated with a soft Lithistid, which forms a flat cake-like crust on the upper surface of B. In the case of specimen A, the Lithistid occurs as a nodule deeply sunk in and incorporated with the *Pachastrella*, and communicating with the exterior by means of tubular vents passing along a deep fissure in the *Pachastrella*.

ἰσόρροπος equally balanced, the name being suggested by the amphityle spicules.

On section of specimen A, the embedded Lithistid appears more vitreous than the surrounding tissues of the *Pachastrella*.

Family **Stellettidæ.**

Stelletta (Astrella) horrens, sp. n.

Plates II and III, fig. 6.

Sponge vase-shaped with thick rounded rim and thick walls of almost stony hardness. Outer or poral surface and inner or oscular surface bristling with strong protriænes and oxea.

Small cribriform groups of oscules, about 1 mm. in diameter, distributed over the whole inner surface slightly below the level of the jungle of projecting spicules; each oscule about .2 mm. in diameter.

Colour of outer surface purplish black, of inner, rufous brown.

Skeleton mainly formed of radiating bundles of protriænes and oxea. Pycnasters forming a layer in the ectosome, and distributed through the choanosome.

Spicules. Megascleres.—Oxea (Fig. 6a) 3900 × 80 μ.

Protriænes (Fig. 6b): rhabdome 3810 × 140 μ; length of cladus 440 to 620 μ, chorda varying from 200 μ to 0 μ, the cladi sharp-pointed, claw-like, occasionally almost meeting.

Microscleres. Pycnasters (Fig. 6, c, d) 6·5 μ in diameter with short pyramidal spines; rarely the pycnasters becoming asters 12 μ in diameter, by lengthening of the spines.

Locality.—Durnford Point, Natal, N.W. ¾ W., distant 12 miles; depth 90 fathoms. Bottom—broken shells.

The vase, which has been cut off sharp from its area of attachment, expands upwards from a massive solid base; the cut surface is oval, 6 × 5 cm. in diameter and shows the skeleton fibres radiating from the centre.

The dimensions of the sponge are as follows:—Height 15 cm., diameter of mouth of vase 15 × 6 cm., thickness of rim 1 cm., depth of cavity of vase 6.5 cm.

The cladi of the remarkable claw-like protriænes are visible to the naked eye, and their presence renders it advisable to handle the specimen very cautiously.

A massive specimen of a *Trachya* is firmly attached to one side of the *Stelletta*, but has not been shown in the figure of the latter on Plate II.

INDEX OF LITERATURE.

[1]. Carter, H. J. Description of a new species of *Tethya*. (Ann. & Mag. Nat. Hist. (4) viii. p. 99, pl. iv. 1871).

[2]. Dendy, A. Report on a second collection of Sponges from the Gulf of Manaar. (Ann. & Mag. Nat. Hist. (6) iii. p. 73, pls. iii.-v. 1889).

[3]. Ijima, I. "Revision of Hexactinellids with Discoctasters, with descriptions of five new species. (Annotationes zoologicæ Japonenses, vol. i. 1897).

[4]. Ijima, I. Long-lines as zoological collecting apparatus. (Zoological Magazine, Tokyo, vol. viii.).

[5]. Ijima, I. Studies on Hexactinellida *I. Euplectellidae*. (Journ. Coll. Science, Tokyo, xv. p. 16, 1901).

[6]. Kirkpatrick, R. Description of a new Hexactinellid Sponge from S. Africa. (Ann. Mag. Nat. Hist. (7) vii. p. 457, pl. viii. 1901).

[7]. Lendenfeld, R. Spongien von Sansibar. (Abhandl. Senckenbergischen Naturforch. Gesellsch. Bd. xxi. p. 93, pls. ix, x. 1899.

[8]. Schulze, F.E. ' Revision des Systemes der Asconematiden und Rosselliden," Sitzungsb. Akad. Wiss. Berlin, 1897.

[9]. Schulze, F. E. "Challenger" Hexactinellida, 1887.

[10]. Schulze, F. E. "Amerikanische Hexactinelliden nach dem Materiale der Albatross-Expedition," 1899.

[11]. Sollas, W. J. Report on the Tetractinellida collected by H.M.S. Challenger, 1888.

[12]. Topsent, E. Etude monographique des Spongiaires de France. (Archives de Zoologie expérimentale et générale (3) ii. p. 259, pls. xi.-xiv. 1894).

EXPLANATION OF PLATES.

Plate I.

Fig. 1. *Crateromorpha lankesteri*, sp. n. ½ nat. size.
Fig. 2. Dermal membrane, × 2.
Fig. 3. Gastral and hypo-gastral layer, × 2.
Fig. 4. Transverse section of stalk of smallest specimen, × 2.
Figs. 5, 6. Parenchymal diacts, × 140.
Fig. 7. Large solitary diact of stalk, × 140.
Fig. 8. Gastral pentact, × 140.
Fig. 9. Dermal pentact from stalk, × 140.
Fig. 10. Hypogastral hexact, × 140.
Fig. 11. Oxyhexaster, × 400.

Plate II.

Fig. 1. *Spongocardium gilchristi*, gen et sp. n. Reduced to ¾ nat. size. *a*, poral vestibule; *b*, oscular cloaca.
Fig. 1A. Vertical section of a smaller specimen. Natural size.
Fig. 2. *Tetilla bonaventura*, sp. n. Natural size.
Fig. 3. *Tetilla casula*, Carter. Natural size.
Fig. 3A. The same, in vertical section.
Fig. 4. *Pachastrella caliculata*, sp. n. Reduced to ⅜ nat. size.
Fig. 5. *Pachastrella isorrhopa*, sp. n. ½ nat. size.
Fig. 6. *Stelletta horrens*, sp. n. ½ nat. size.

Plate III.

Fig. 1. *Spongocardium gilchristi*. *a*. Oxea, × 25.
b. Smaller oxea, × 25.
c. Protriæne, × 25; *c′*, head of *c*, × 100.
d. Orthotriænes; *d′*, plagiotriæne, × 25.
e. Two orthodiænes, × 25.
f. Orthomonæne, × 25.
g. Anatriæne, × 25; *g′*, head of same, × 100.
h. Head of trichodal protriæne, × 425.
k. Trichodal prodiæne, × 100; *k′*, head of *k*, × 425.
l. Large sigmaspires, × 425.
m. Smaller sigmaspires, × 425.

Fig. 2. *Tetilla bonaventura* *a.* Oxea, × 25.

b, b′. Smaller oxea and styles, × 25.

c. Anatriæne, × 25; *c′*, head of same, × 100.

d. Anadiæne, × 100.

e. Anamonæne, × 100.

f. Protriæne, × 25; *f′*, ditto, × 100.

g. Cladome of prodiæne, × 100.

h. Trichodal protriæne, × 425.

k. Sigmaspires, × 425.

Fig. 4. *Pachastrella caliculata*. *a*. Oxea (half length), × 25.

b. One ray of large calthrops, × 25.

c, d, e, f. Calthrops, × 100.

g. Microstrongyles, × 800.

h. Microrhabds, × 880.

k. Amphiasters, × 880.

Fig. 5. *Pachastrella isorrhopa*.

a. Amphityle, × 100.

b. Strongyle (in specimen B), × 100.

Fig. 6. *Stelletta horrens*. *a*. Oxea, × 25.

b. Protriænes, × 25.

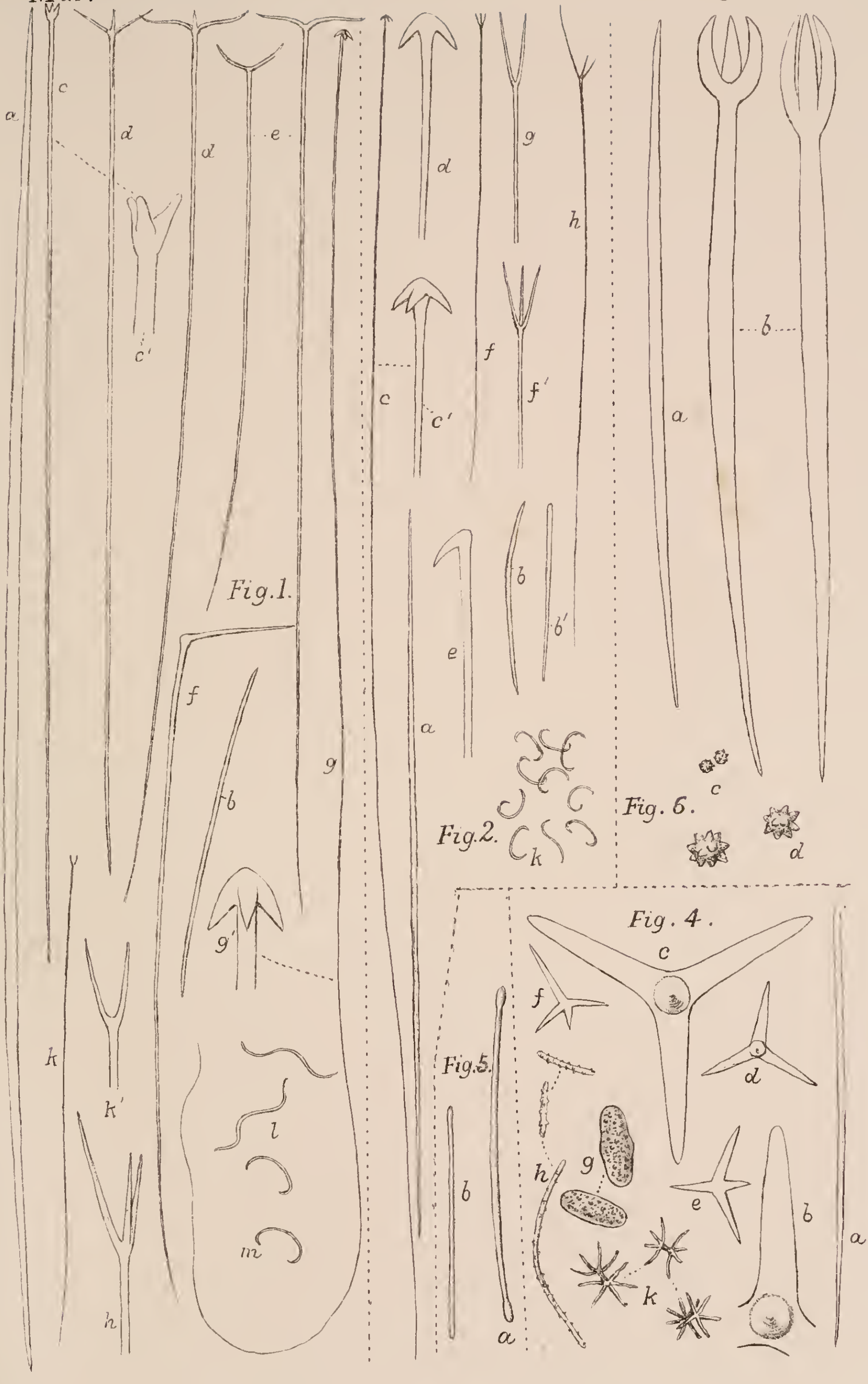
c. Pycnasters, × 425; *d*, the same, × 880.

PUBLISHED 24TH JULY, 1902.

P. Highley del. et lith. Hanhart imp.

P. Highley del. et lith.

Hanhart imp.



P. Highley del. et lith
Hanhart imp.

INDEX.

FISHES

(See also Catalogue of Fishes recorded from South Africa, pp. 97-179).

Achirus, 1
Algoa Bay, 4, 11, 12
Ansjovis, 12
antipodum (Engraulis), 12
antiquorum (Hippocampus), 11
Archirus capensis, 1, 2
Arnoglossus capensis, 1
Arnoglossus laterna, 1
axillaris (Caesio), 10
bleekeri (Solea), 1, 2
Brak River, 8
Buffalo Bay, 10
Caesio axillaris, 10
Caesio lunaris, 10
Callionymus costatus, 9
capensis (Achirus), 1, 2
capensis (Arnoglossus), 1
capensis (Cynoglossus), 1, 4
capensis (Heteromycterus), 2
capensis (Hippocampus), 11
capensis (Plagusia), 4
capensis (Trulla), 4
Cape St. Blaize, 9
cepedianus (Lophotes), 13
costatus (Callionymus), 9
cristatus (Lophotes), 13
Cynoglossus, 1
Cynoglossus capensis, 1, 4
Dassen Island, 3, 4
enchrasicholus (Engraulis), 12
Engraulis antipodum, 12
Engraulis enchrasicholus, 12
Engraulis holodon, 12
False Bay, 2, 4, 10
fiskii (Lophotes), 13
gilchristi (Gobius), 8
Gobius gilchristi, 8
Heteromycteris capensis, 2
Hippocampus antiquorum, 11
Hippocampus capensis, 11
holodon (Engraulis), 12
impar (Pegusa), 2
Kalk Bay, 13
Knysna, 11
laterna (Arnoglossus), 1
Lophotes cepedianus, 13
Lophotes cristatus, 13
Lophotes fiskii, 13
lunaris (Caesio), 10
marginata (Synaptura), 11
microlepis (Synaptura), 1, 3, 11
Mossel Bay, 8, 13
pectoralis (Synaptura), 1, 3, 11
Pegusa impar, 2
Plagusia capensis, 4
Solea, 1
Solea bleekeri, 1, 2
Solea vulgaris, 4
Synaptura, 1
Synaptura marginata, 11
Synaptura microlepis, 1, 3, 11
Synaptura pectoralis, 1, 3, 11
Trulla capensis, 4
vulgaris (Solea), 4
Zwartkops River, 12

CRUSTACEA.

(For names of specimens see author's index, p. 65).

Algoa Bay, 30, 37, 46
Auckland, 55.
Augulhas Bank, 29
Australia, 55, 59
Bird Island, 20
Cape St. Blaize, 32
Chili, 55
East London, 51
False Bay, 22, 26, 32, 63
Gordon's Bay, 41
Geree Island, 15, 51
Indian Ocean, 55

Crustacea.—*Continued.*

Java, 57, 59
Kalk Bay, 59
Marion Island, 29
Mossel Bay, 15
Natal, 20
New Zealand, 55, 59
Nightingale Island, 29
Patagonia, 29, 61
Rio Janeiro, 55
Saldanha Bay, 22
Senegambia, 15, 51
Simon's Bay, 15, 46, 57
Table Bay, 22, 36, 55
Teneriffe, 57
Zwartkops River, 46

MOLLUSCA.

Buccinidae, 5, 6
Cancellaria, 6
Cape of Good Hope, 6
Chrysodomus, 5
Fusidae, 5
Fusus norvegicus, 5
gilchristi (Neptuneopsis), 6
Neptunea, 5
Neptunea norvegica, 5
Neptuneopsis, 5
Neptuneopsis gilchristi, 6
norvegica (Neptunea), 5
norvegicus (Fusus), 5
Voluta, 5, 6
Volutidae, 5
Volutopsis, 5

ALCYONARIA AND HYDROCORALLINAE.

Acrophytum, 75
Acrophytum claviger, 67, 70, 74
albicans (Eunicella), 69
albicans (Gorgonia), 69
albitincta (Melitodes), 81
Alcyonacea, 70
Alcyonidae, 72
Alcyonium antarcticum, 68, 70, 73
Alcyonium coralloides, 84
Alcyonium dilitatum, 77, 86
Alcyonium pachyclados, 70, 72
Algoa Bay, 69, 70, 72, 74, 75, 78, 79, 82
Allopora nobilis, 93
Allopora oculina, 94
Allopora venusta, 93
antarcticum (Alcyonium), 70, 73
Anthelia capensis, 69, 70
Anthomastus, 74
Australasiae (Veretillum), 89
Briareidae, 78
capensis (Anthelia), 69, 70
capensis (Euplexaura), 69
capensis (Gorgonia), 67, 70, 83, 84
capensis (Heteroxenia), 67, 70
capensis (Isidella), 69, 86
capensis (Primnoisis), 69, 70, 86
Cape of Good Hope, 79
Cape St. Blaize, 70, 71, 83
Cavernularia, 68
Cavernularia elegans, 70, 89
Cavernularia obesa, 70, 92
chamaeleon (Muricea), 80
claviger (Acrophytum), 67, 70, 74
coralloides (Alcyonium), 84
coralloides (Sympodium), 84
Cordiceps, 74
crista (Lophogorgia), 69
dichotoma (Isis), 80
dichotoma (Melitodes), 70, 80
digitatum (Alcyonium), 77, 86
East London, 70, 73, 77, 87
elegans (Cavernularia), 70, 89
elegans (Sarcobelemnon), 89
elegans (Veretillum), 89
Elizabethae (Heteroxenia), 71
elongata (Juncella), 70, 85
Esperella, 79
Eunephthya thyrsoidea, 69
Eunicella, 78
Eunicella albicans, 69
Eunicella palma, 69
Eunicella papillosa, 69, 70, 86
Euplexaura capensis, 69
flammea (Gorgonia), 69, 70, 81, 83, 84, 85
flammea (Leptogorgia), 69
False Bay, 69, 70, 71, 80, 82, 89, 93

Alcyonaria and Hydrocorallinae.—*Continued.*

gattyiae (Homophyton), 79
gemmacea (Juncella), 86
Gorgonacea, 79
Gorgonellidae, 85
Gorgonia, 68, 78
Gorgonia albicans, 69
Gorgonia capensis, 67, 70, 83, 84
Gorgonia flammea, 69, 70, 81, 83, 84, 85
Gorgonia Lütkeni, 83
Gorgonia palma, 81, 82
Gorgonia pinnata, 84
Gorgonidae, 81
gracilis (Stylaster), 93
gustavianum (Halisceptrum), 88
Halisceptrum gustavianum, 88
Halisceptrum parvifolia, 88
Heard Island, 74
Heliopora, 68
Heteroxenia, 68
Heteroxenia capensis, 67, 70
Heteroxenia Elizabethae, 71
Heteroxenia rigida, 71
Homophyton gattyiae, 79
Hydrocorallinae, 93
Isidella capensis, 69, 86
Isis dichotoma, 80
juncea (Juncella), 86
Juncella, 78
Juncella elongata, 70, 85
Juncella gemmacea, 86
Juncellea juncea, 86
Kerguelen, 74
Korean Strait, 93
Leptoclinum speciosum, 70
Leptogorgia, 81, 83
Leptogorgia flammea, 69
Leptogorgia palma, 69
Lobophytum, 74
Lophogorgia, 81, 82
Lophogorgia crista, 69
Lütkeni (Gorgonia), 83
mauritiensis (Villogorgia), 70, 87
Mauritius, 87
Melitodes, 78
Melitodes albitincta, 81
Melitodes dichotoma, 70, 80
Melitodidae, 80
Mossel Bay, 82
Muricea chamaeleon, 80
Muriceidae, 87
Neah Bay, 93
Nepthya, 84
nobilis (Allopora), 93
obesa, (Cavernularia), 70, 92
oculina (Allopora), 94
pachyclados (Alcyonium), 70, 72
palma (Eunicella), 69
palma (Gorgonia), 81
palma (Leptogorgia), 69
papillosa (Eunicella), 69, 70, 86
Paragorgia, 84
parvifolia (Halisceptrum), 88
Pennatulacea, 87
Pennatulids, 68
pinnata (Gorgonia), 84
pinnata (Pterogorgia), 84
Platygorgia, 69
Plexauridae, 86
Port Alfred, 70, 92
Port Natal, 88
Primnoidae, 86
Primnoisis, 78
Primnoisis capensis, 69, 70, 86
Prince Edward Island, 83
Pterogorgia pinnata, 84
Reinwardti (Virgularia), 70
reinwardti (Virgularia), 87
rigida (Heteroxenia), 71
Rij Bank, 72, 78, 82, 86, 87
Robben Island, 91
Sarcobelemnon elegans, 89
Sarcophytum, 68, 74
Sarcophytum trochiforme, 67, 70
Seal Island, 82
Solanderia verrucosa, 69, 79
speciosum (Leptoclinum), 71
Spongioderma, 78, 86
Spongioderma verrucosum, 69, 70, 78
Spongodes, 68
St. Francis Bay, 70, 88
Stylaster, 93
Stylaster gracilis, 94
Sympodium coralloides, 84
thyrsoidea (Eunephthya), 69
Torres Straits, 93
trochiforme (Sarcophytum), 67, 70
Tubipora, 68
venusta (Allopora), 93
Veretilleae, 89
Veretillum Australasiae, 89
Veretillum elegans, 89
verrucosa (Solanderia), 69, 79
verrucosum (Spongioderma), 69, 70, 78
Villogorgia, 78
Villogorgia mauritiensis, 70, 87
Virgularia Reinwardti, 70
Virgularia reinwardti, 87
Virgularidae, 87
Xeniidae, 70

SPONGES.

abyssi (Pachastrella), 228
Astrella horrens, 229
Acanthascinae, 220
barbata (Cinachyra), 225
Bathydorus, 224
bonaventura(Tetilla), 226
caliculata (Pachastrella , 227
Cape Natal, 225
casula (Tethya), 226
casula (Tetilla), 226
Cinachyra, 225
Cinachyra barbata, 225
Cinachyra voeltzkowi, 225
Cone Point, 228
coronida (Tetilla), 226
Crateromorpha, 222
Crateromorpha lankesteri, 222
Crateromorpha meyeri, 224
Durnford Point, 227, 229
East London, 223
False Bay, 226, 227
gilchristi (Spongocardium), 224
Gulf of Manaar, 225
Hexactinellida, 220
hirsuta (Tetilla), 225
horrens (Astrella), 229
horrens (Stelletta), 229
isorrhopa (Pachastrella), 229
Kerguelen, 225
lankesteri (Crateromorpha), 222
Lion's Head, 222
lophodigitatus (Rhabdocalyptus), 220
meyeri (Crateromorpha), 224
monilifera (Pachastrella), 228
Natal, 227, 229
Pachastrella, 227
Pachastrella abyssi, 228
Pachastrella caliculata, 227
Pachastrella isorrhopa, 228
Pachastrella monilifera, 228
Pachastrellidae, 227
pedifera (Tetilla), 226
pleorhaphides (Staurocalyptus), 222
plumodigitatus (Rhabdocalyptus), 220
Port Elizabeth, 227
Rhabdocalyptus, 220
Rhabdocalyptus lophodigitatus, 220
Rhabdocalyptus plumodigitatus, 220
Rossellidae, 220
Rossellinae, 222
Spongocardium, 224
Spongocardium gilchristi, 224
Staurocalyptus pleorhaphides, 222
Stelletta horrens, 229
Stellettidae, 229
Tethya casula, 226
Tetilla, 226
Tetilla bonaventura, 226
Tetilla casula, 226
Tetilla coronida, 226
Tetilla hirsuta, 225
Tetilla pedifera, 226
Tetillidae, 224
Trachya, 229
voeltzkowi (Cinachyra), 225
Zanzibar, 225

ADDENDA ET CORRIGENDA.

South African Crustacea.

On p. 30 in the reference to "*Linuparis*, White, 1847," the generic name should be *Linuparus*. Attention was called to this by Dr. Woodward in the Geological Magazine, vol. 7, p. 394, where, however, the error is not traced back to its source in the report on the Challenger Macrura.

P. 33. To the list of those who have used *Astacus* as the generic name of the lobster may be added Westwood, in the Entomologist's Text-book, p. 101, 1836.

P. 37. In the last line the epithet "perplexing" is quite inappropriate to the statement quoted from Huxley, and the comment upon it with which the paragraph ends on p. 38 is quite beside the purpose. The mistake arose from a confusion of the eighth somite of the body with what is sometimes called the eighth thoracic somite. As my friend Dr. W. T. Calman promptly pointed out, there is only an infinitesimal difference between Huxley's observation that the second maxilliped in the lobster is without an arthrobranchia, and the explanation by Boas that this arthrobranchia is reduced to a pimple.

P. 49. In the synonymy of *Ægeon* should have been included a reference to Faxon's Stalk-eyed Crustacea of the Albatross, Mem. Mus. Comp. Zoöl. Harvard, vol. 18, 1895, where an important footnote to p. 134 discusses that genus (with the changed spelling *Ægaeon*), and expresses the opinion that Bate's *Pontocaris* is to be identified with it.

Pp. 54, 55. Some modifications in the description of the first maxillæ and maxillipeds of *Paridotea ungulata* are supplied in the account now given of the family *Idoteidae*.

P. 60. It should have been mentioned that the specimen of *Sphyrion laevigatum* was taken from a *Genypterus capensis*, locally known as the "King-Klipfish."

Alcyonaria and Hydrocorallinae.

P. 71, line 15 from bottom, for H. rigida read Xenia rigida.
P. 73, line 15 from top, add "these" before three specimens.
P. 74, line 4 from bottom, for Marzeller read Marenzeller.
P. 78, line 18 from top, for Alcyonarian read Alcyonaria.
P. 84, line 11 from bottom, for princpal read principal.
P. 94, in 8 of list, for Alcyonides read Alcyonider.

Observations on the Temperature and Salinity of the Sea.

Surface temperatures were taken with Negretti & Zambra's Marine Thermometers. Temperatures below surface, with Negretti & Zambra's reversing Thermometers (Scottish frame). The errors of the thermometers were determined (Kew certificates and subsequent verifications) and were in no cases found to exceed one-tenth of a degree. The thermometers at Robben Island and Roman Rock supplied to the lighthouse keepers were the Marine Thermometers of Negretti & Zambra, and were accurate to one-tenth of a degree when sent out, though no opportunity was afforded for visiting these stations subsequently.

The methods of analysis of sea waters were as follows :—

The samples as received in the laboratory were examined for Chlorine, Sulphuric Oxide and Specific Gravity.

(1) CHLORINE.—10 c.c. were titrated with $\frac{N}{10}$ Silver Nitrate, using Chlorine free Potassium Chromate as indicator.

(2) SULPHURIC OXIDE.—10 c.c. were acidulated with Hydrochloric acid and precipitated with Barium Chloride at 100° C. The precipitate was allowed to stand 24 hours and was then collected, washed, incinerated in muffle furnace, taking precautions to prevent change of Barium Sulphate, and weighed.

(3) SPECIFIC GRAVITY.—Determined at 15° C in pyknometer of capacity about 50 c.c. The balance used turned at $\frac{1}{10}$ milligramme.

In all the determinations the same instruments were used and the conditions of work were kept as far as possible from variation. All results, except those expressing the Specific Gravity, are given in grains per gallon.